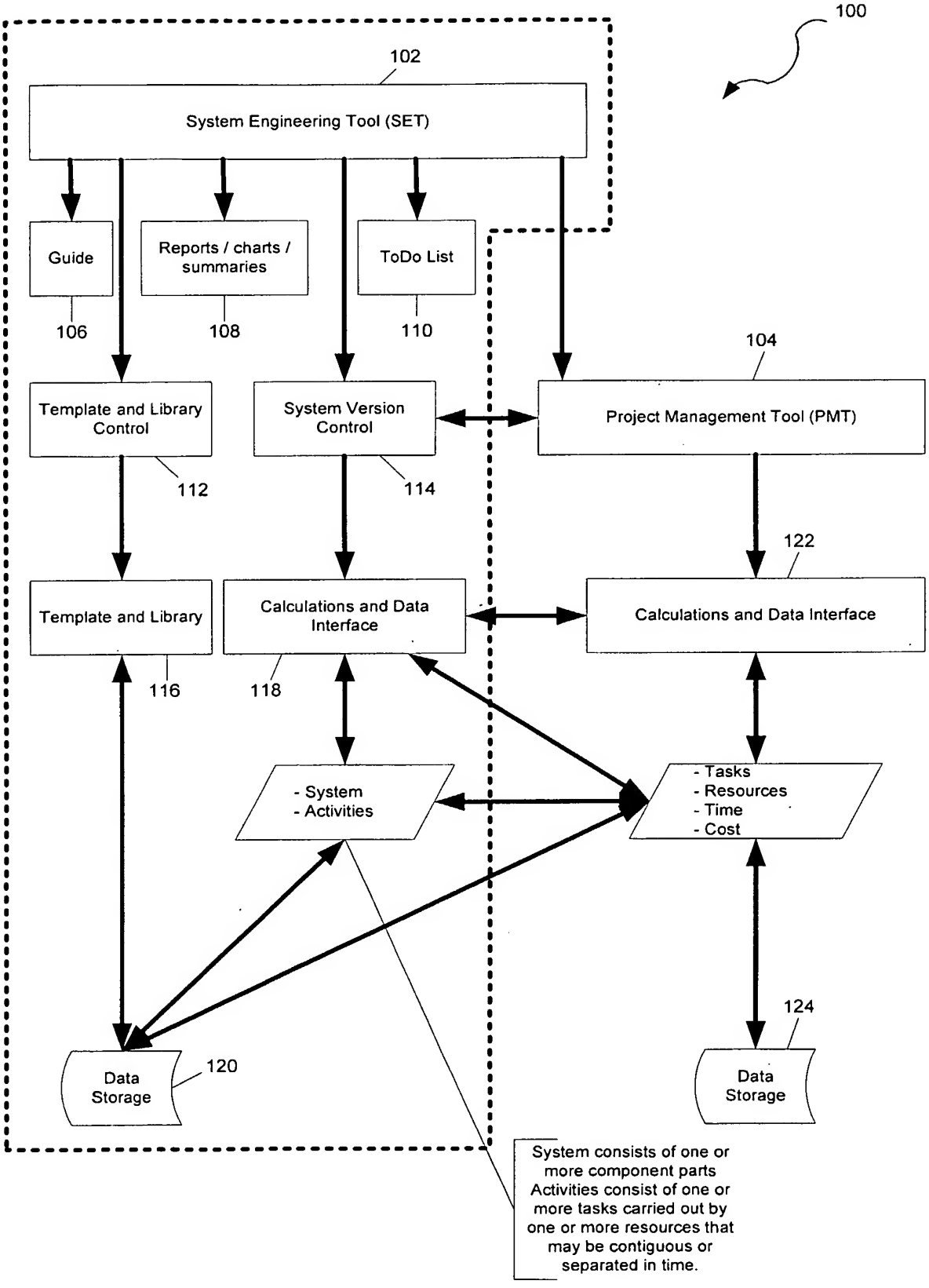
100
102
System Engineering Tool (SET)
Guide
Reports / charts / summaries
ToDo List
106
108
110
104
Template and Library Control
System Version Control
Project Management Tool (PMT)
112
114
122
Template and Library
Calculations and Data Interface
Calculations and Data Interface
116
118
- System
- Activities
- Tasks
- Resources
- Time
- Cost
124
Data Storage
120
Data Storage
System consists of one or more component parts
Activities consist of one or more tasks carried out by one or more resources that may be contiguous or separated in time.

Figure 1

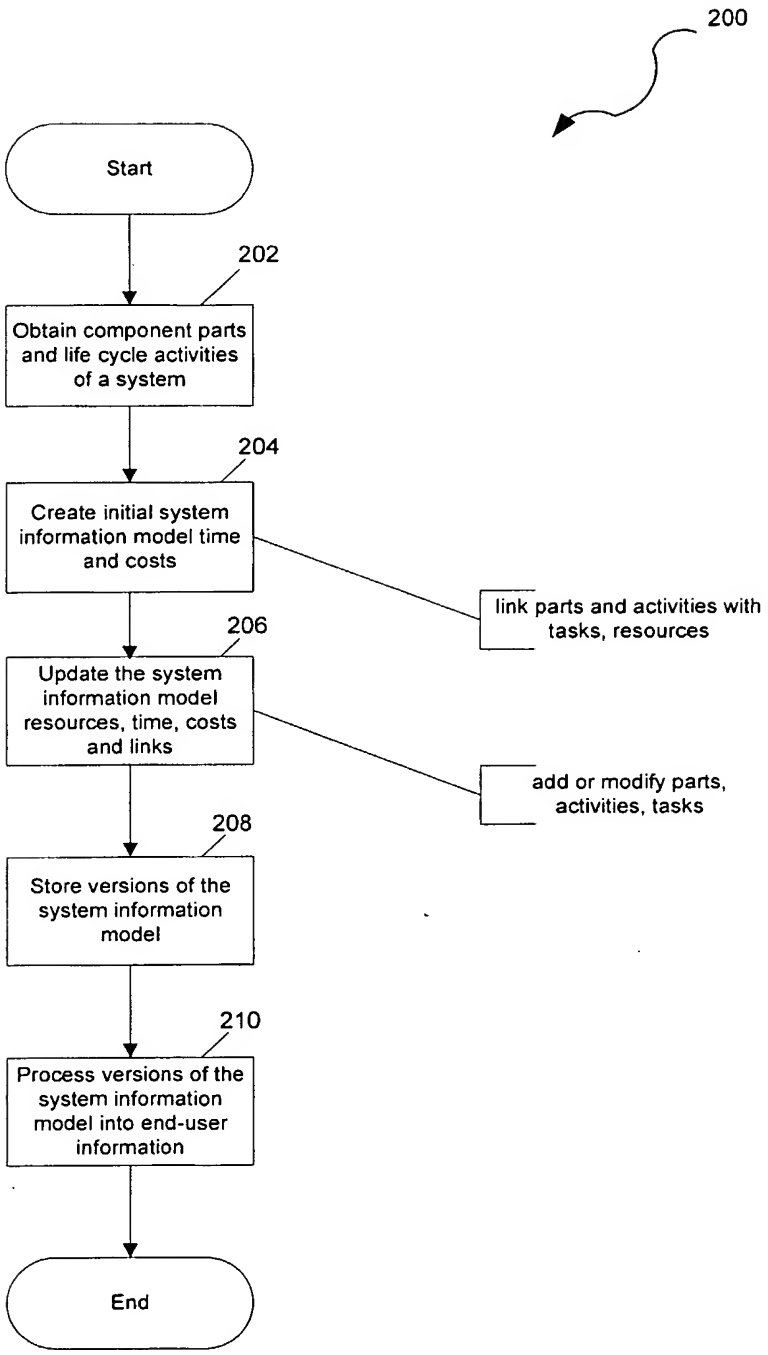
200
Start
202
Obtain component parts and life cycle activities of a system
204
Create initial system information model time and costs
link parts and activities with tasks, resources
206
Update the system information model resources, time, costs and links
add or modify parts, activities, tasks
208
Store versions of the system information model
210
Process versions of the system information model into end-user information
End

Figure 2

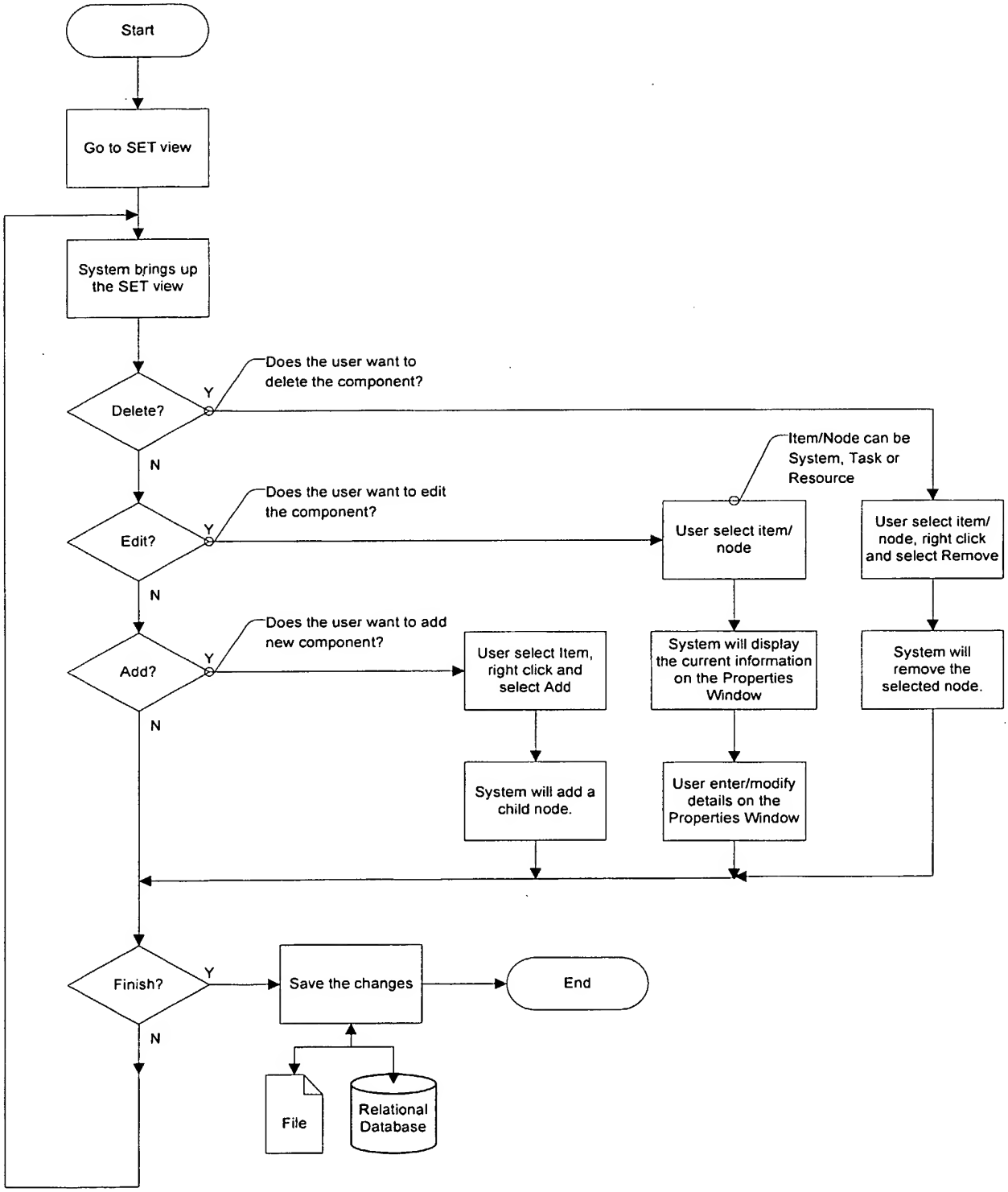
Start
Go to SET view
System brings up the SET view
Delete?
Does the user want to delete the component?
Y
N
Edit?
Does the user want to edit the component?
Y
N
Add?
Does the user want to add new component?
Y
N
Item/Node can be System, Task or Resource
User select item/ node
User select item/ node, right click and select Remove
User select Item, right click and select Add
System will display the current information on the Properties Window
System will remove the selected node.
System will add a child node.
User enter/modify details on the Properties Window
Finish?
Y
N
Save the changes
End
File
Relational Database

Figure 3a

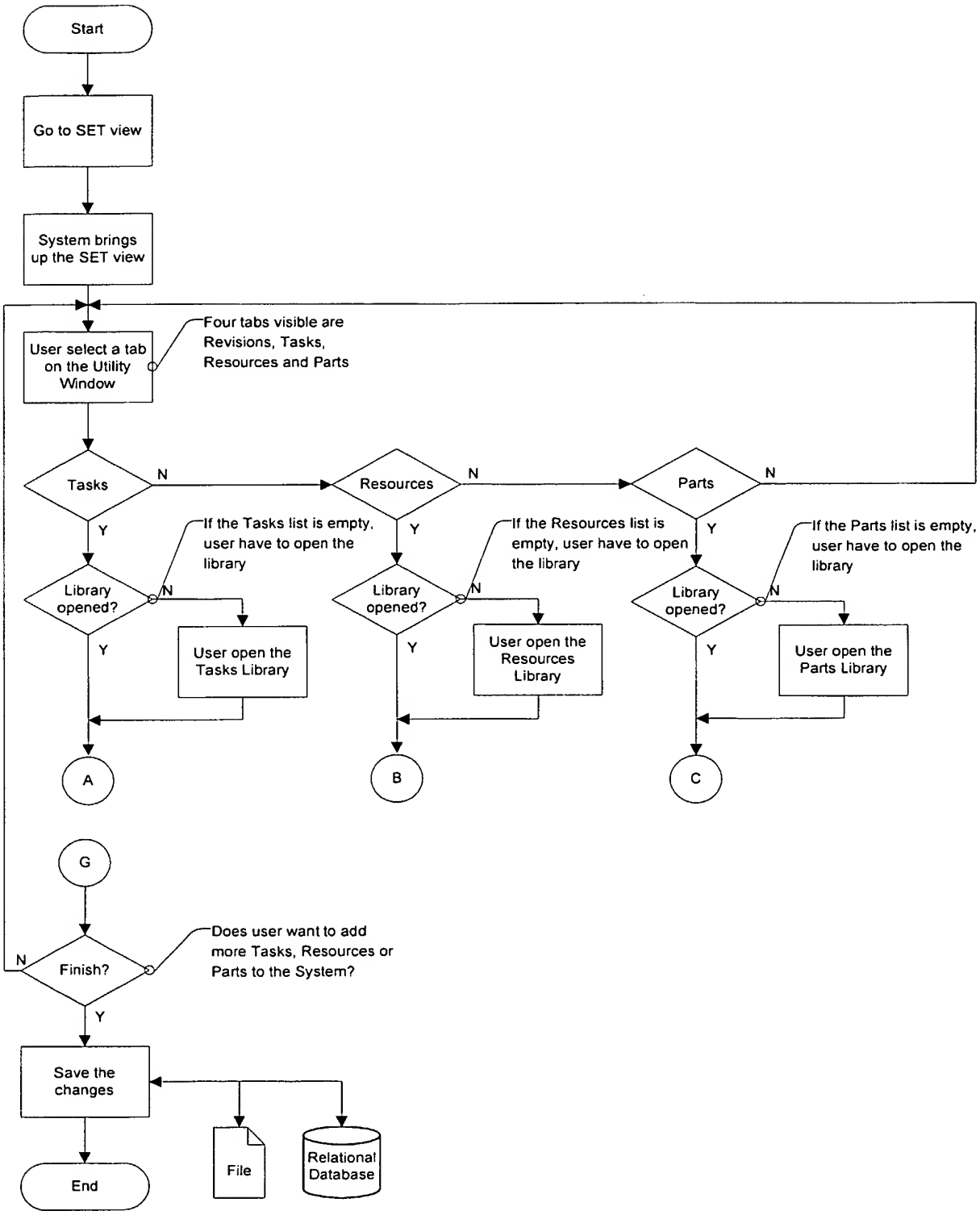
Start
Go to SET view
System brings up the SET view
User select a tab on the Utility Window
Four tabs visible are Revisions, Tasks, Resources and Parts
Tasks
Resources
Parts
N
Y
If the Tasks list is empty, user have to open the library
If the Resources list is empty, user have to open the library
If the Parts list is empty, user have to open the library
Library opened?
User open the Tasks Library
User open the Resources Library
User open the Parts Library
A
B
C
G
Finish?
Does user want to add more Tasks, Resources or Parts to the System?
Save the changes
File
Relational Database
End

Figure 3b

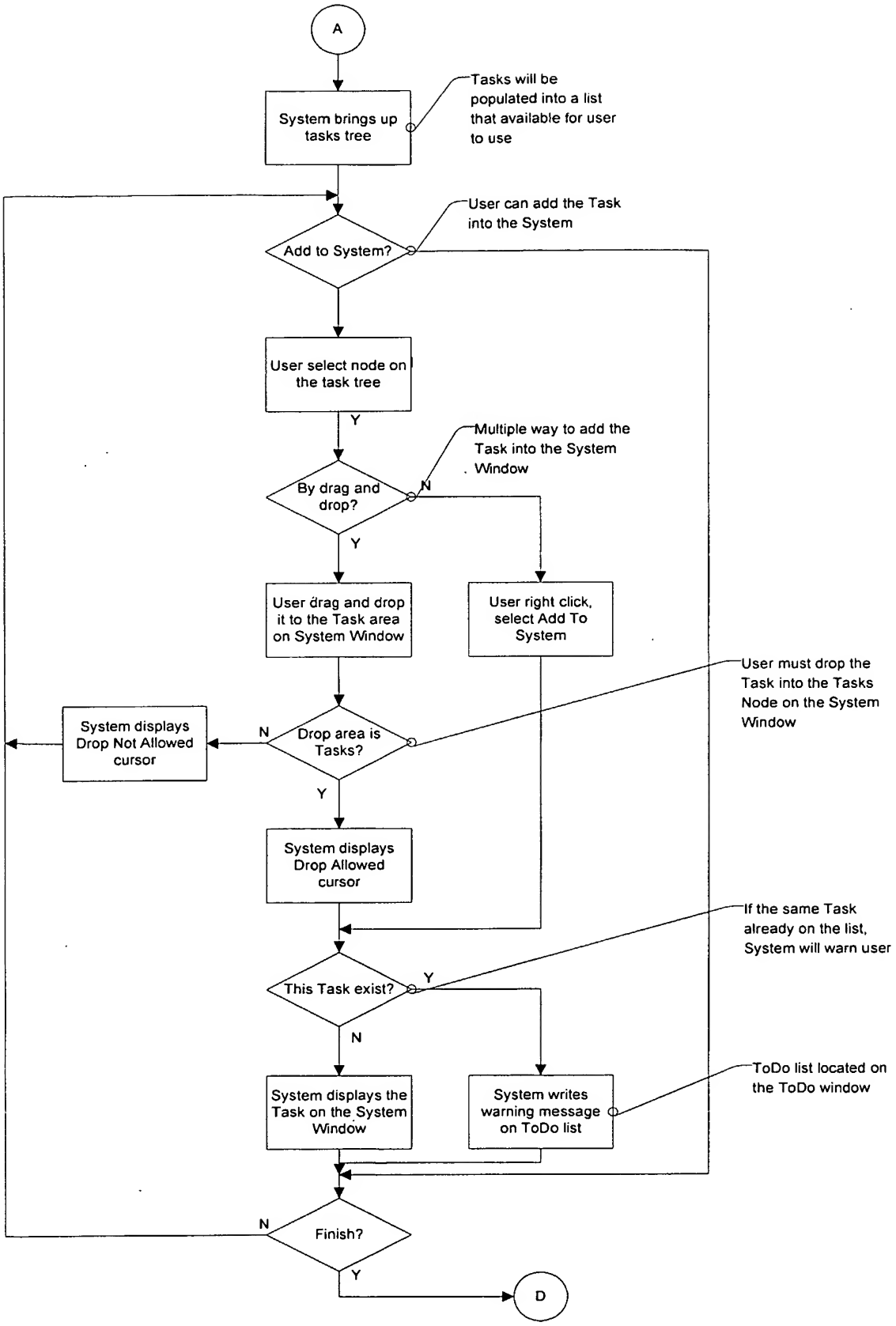
A
System brings up tasks tree
Tasks will be populated into a list that available for user to use
Add to System?
User can add the Task into the System
User select node on the task tree
Y
By drag and drop?
N
Multiple way to add the Task into the System Window
Y
User drag and drop it to the Task area on System Window
User right click, select Add To System
Drop area is Tasks?
N
System displays Drop Not Allowed cursor
User must drop the Task into the Tasks Node on the System Window
Y
System displays Drop Allowed cursor
This Task exist?
Y
If the same Task already on the list, System will warn user
N
System displays the Task on the System Window
System writes warning message on ToDo list
ToDo list located on the ToDo window
Finish?
N
Y
D

Figure 3c

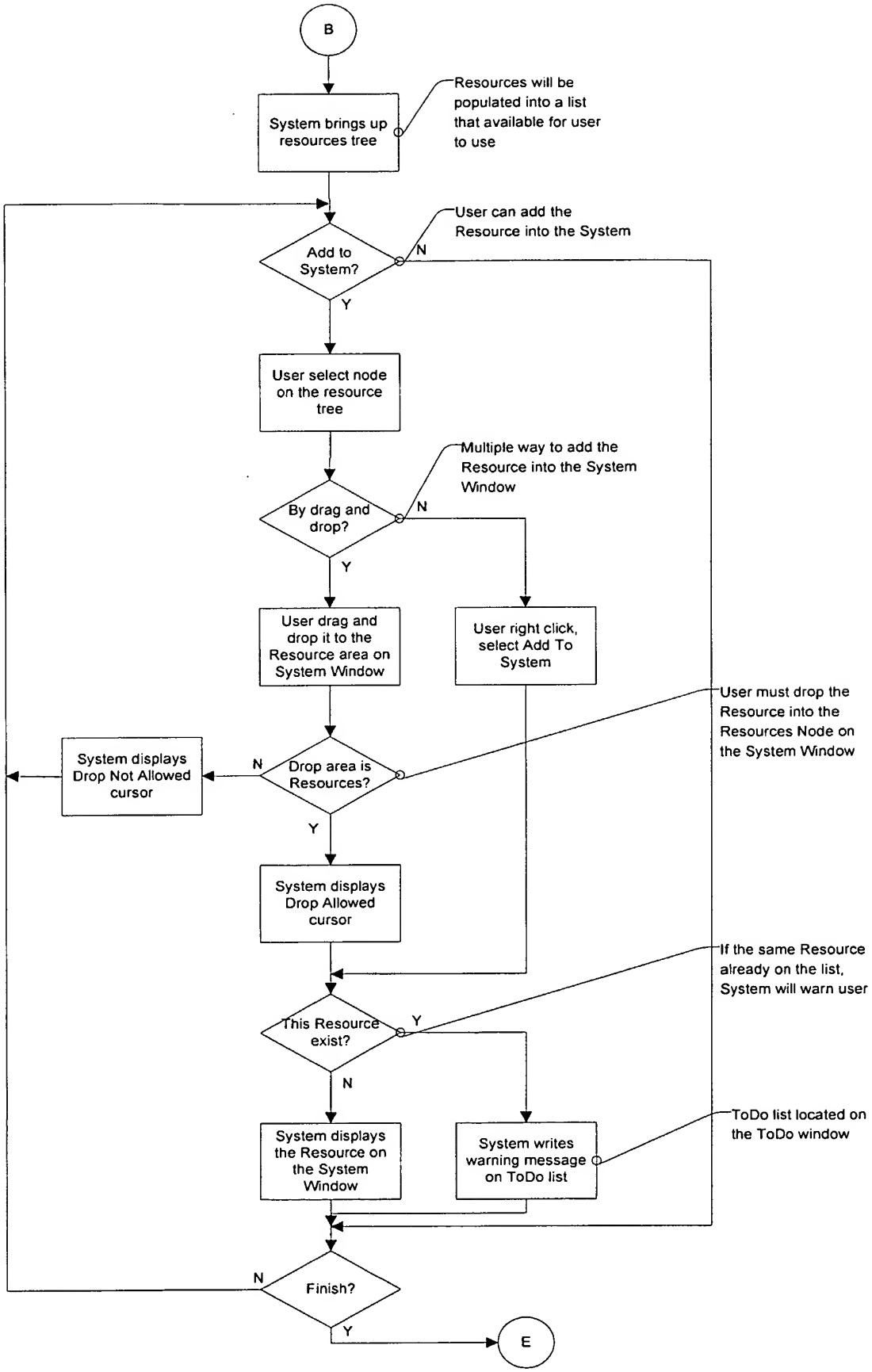
B
System brings up resources tree
Resources will be populated into a list that available for user to use
Add to System?
User can add the Resource into the System
N
Y
User select node on the resource tree
By drag and drop?
Multiple way to add the Resource into the System Window
N
Y
User drag and drop it to the Resource area on System Window
User right click, select Add To System
Drop area is Resources?
N
System displays Drop Not Allowed cursor
User must drop the Resource into the Resources Node on the System Window
Y
System displays Drop Allowed cursor
This Resource exist?
Y
If the same Resource already on the list, System will warn user
N
System displays the Resource on the System Window
System writes warning message on ToDo list
ToDo list located on the ToDo window
Finish?
N
Y
E

Figure 3d

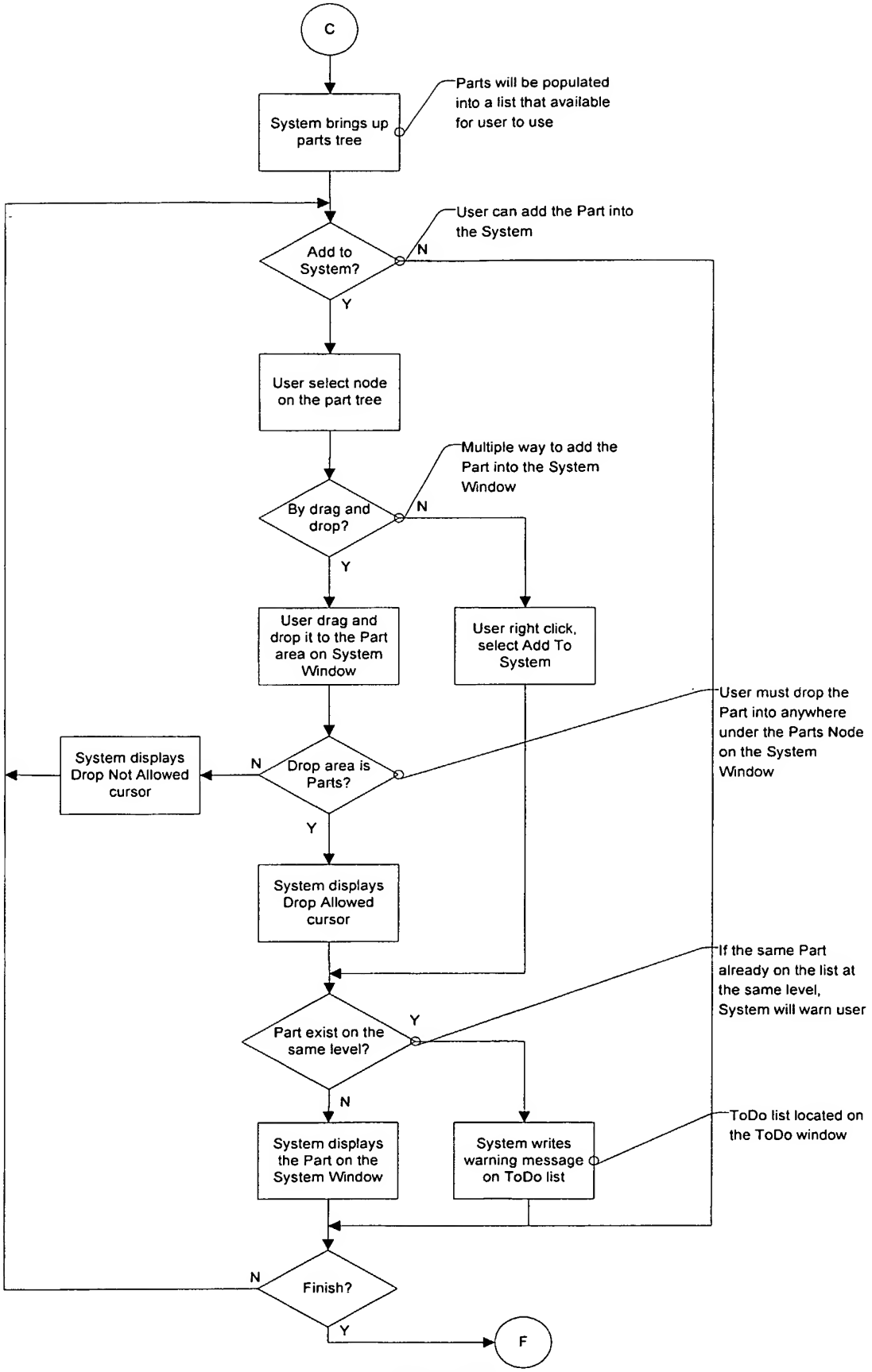
C
System brings up parts tree
Parts will be populated into a list that available for user to use
Add to System?
User can add the Part into the System
N
Y
User select node on the part tree
By drag and drop?
Multiple way to add the Part into the System Window
N
Y
User drag and drop it to the Part area on System Window
User right click, select Add To System
Drop area is Parts?
User must drop the Part into anywhere under the Parts Node on the System Window
N
System displays Drop Not Allowed cursor
Y
System displays Drop Allowed cursor
Part exist on the same level?
If the same Part already on the list at the same level, System will warn user
Y
N
System displays the Part on the System Window
System writes warning message on ToDo list
ToDo list located on the ToDo window
Finish?
N
Y
F

Figure 3e

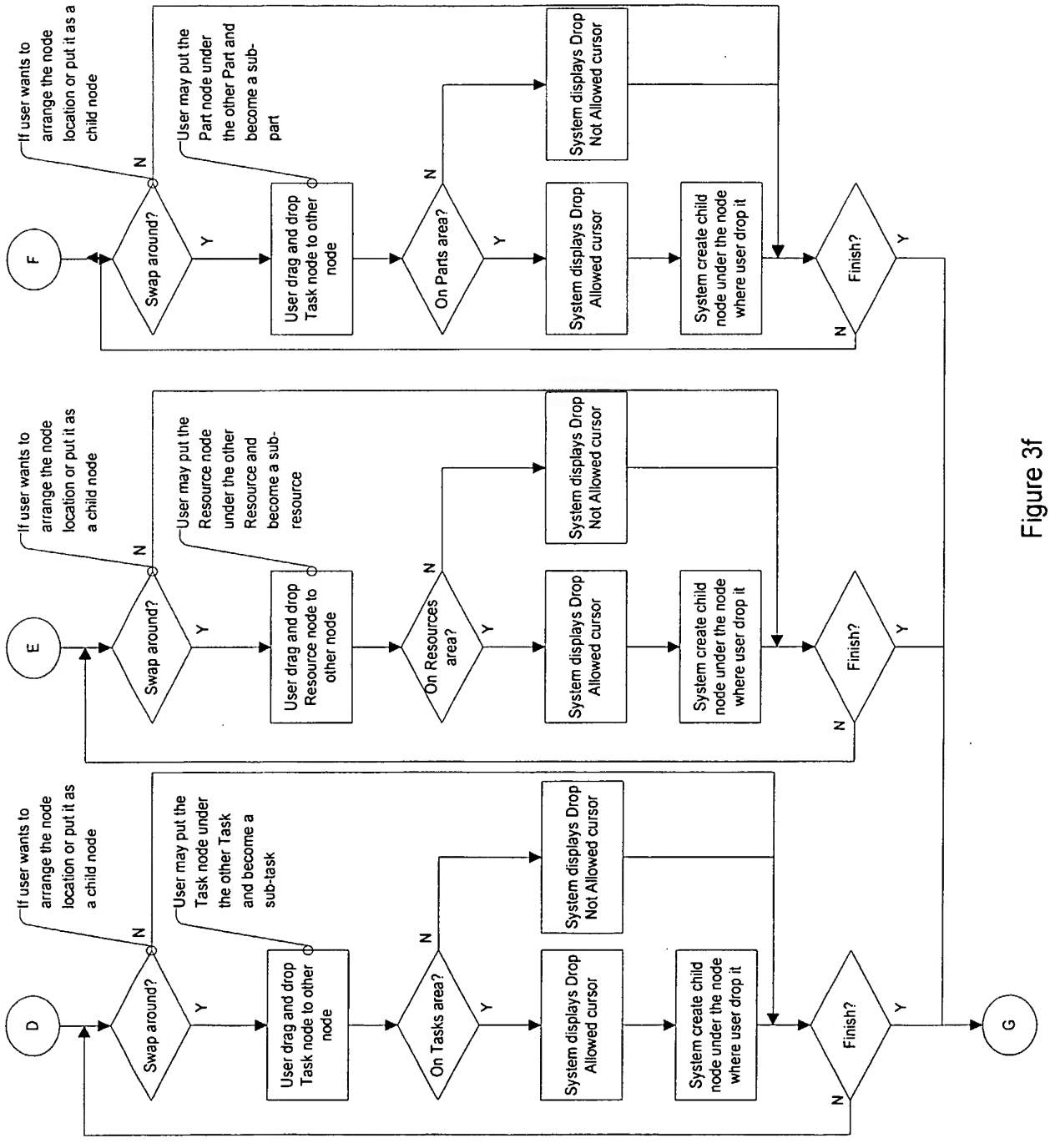
D
Swap around?
If user wants to arrange the node location or put it as a child node
N
Y
User may put the Task node under the other Task and become a sub-task
User drag and drop Task node to other node
On Tasks area?
N
Y
System displays Drop Not Allowed cursor
System displays Drop Allowed cursor
System create child node under the node where user drop it
Finish?
N
Y
E
Swap around?
If user wants to arrange the node location or put it as a child node
N
Y
User may put the Resource node under the other Resource and become a sub-resource
User drag and drop Resource node to other node
On Resources area?
N
Y
System displays Drop Not Allowed cursor
System displays Drop Allowed cursor
System create child node under the node where user drop it
Finish?
N
Y
F
Swap around?
If user wants to arrange the node location or put it as a child node
N
Y
User may put the Part node under the other Part and become a sub-part
User drag and drop Task node to other node
On Parts area?
N
Y
System displays Drop Not Allowed cursor
System displays Drop Allowed cursor
System create child node under the node where user drop it
Finish?
N
Y
G

Figure 3f

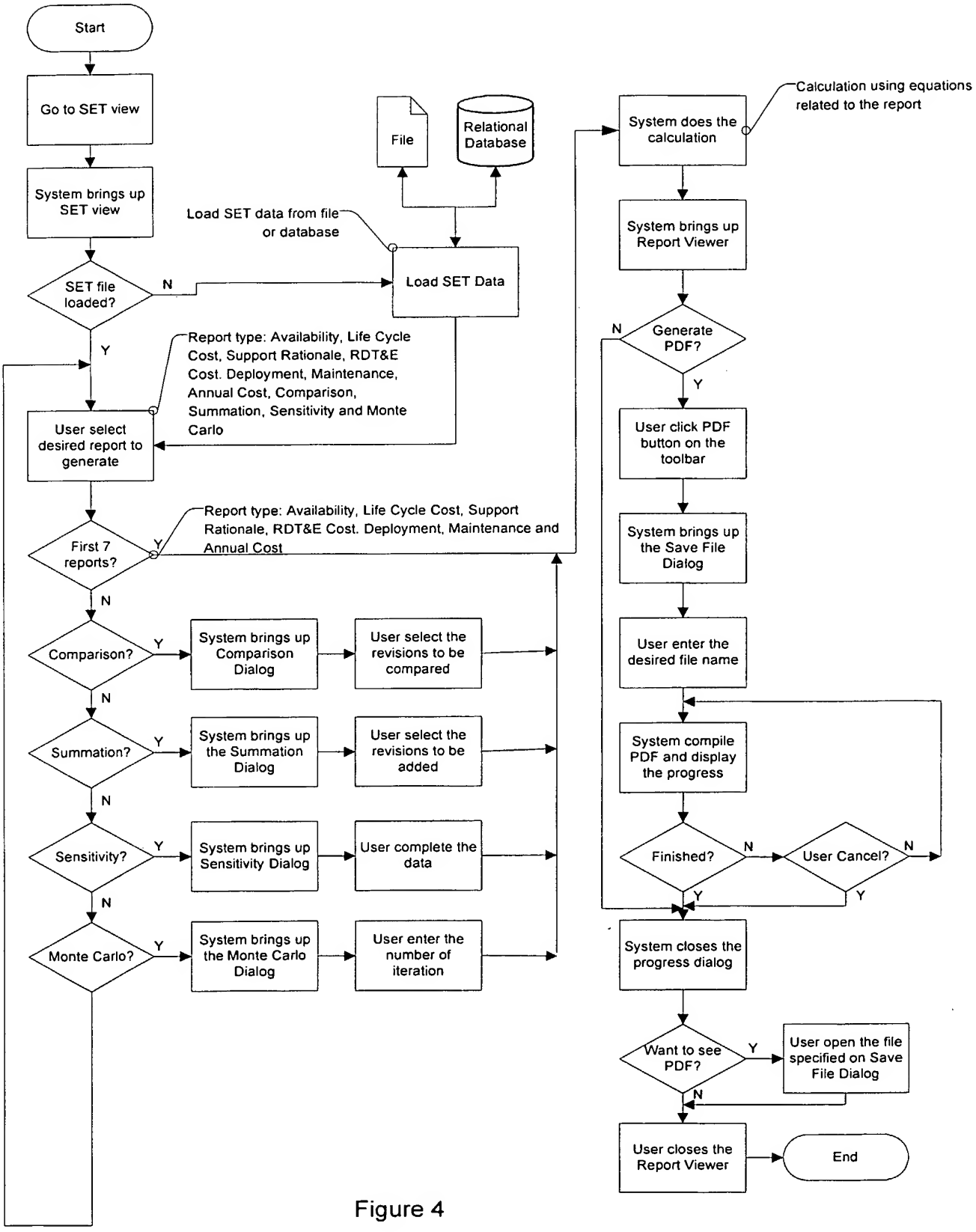
Start
Go to SET view
System brings up SET view
SET file loaded?
N
Y
File
Relational Database
Load SET data from file or database
Load SET Data
Report type: Availability, Life Cycle Cost, Support Rationale, RDT&E Cost. Deployment, Maintenance, Annual Cost, Comparison, Summation, Sensitivity and Monte Carlo
User select desired report to generate
First 7 reports?
Y
Report type: Availability, Life Cycle Cost, Support Rationale, RDT&E Cost. Deployment, Maintenance and Annual Cost
N
Comparison?
Y
System brings up Comparison Dialog
User select the revisions to be compared
N
Summation?
Y
System brings up the Summation Dialog
User select the revisions to be added
N
Sensitivity?
Y
System brings up Sensitivity Dialog
User complete the data
N
Monte Carlo?
Y
System brings up the Monte Carlo Dialog
User enter the number of iteration
System does the calculation
Calculation using equations related to the report
System brings up Report Viewer
Generate PDF?
N
Y
User click PDF button on the toolbar
System brings up the Save File Dialog
User enter the desired file name
System compile PDF and display the progress
Finished?
N
User Cancel?
N
Y
Y
System closes the progress dialog
Want to see PDF?
Y
User open the file specified on Save File Dialog
N
User closes the Report Viewer
End

Figure 4

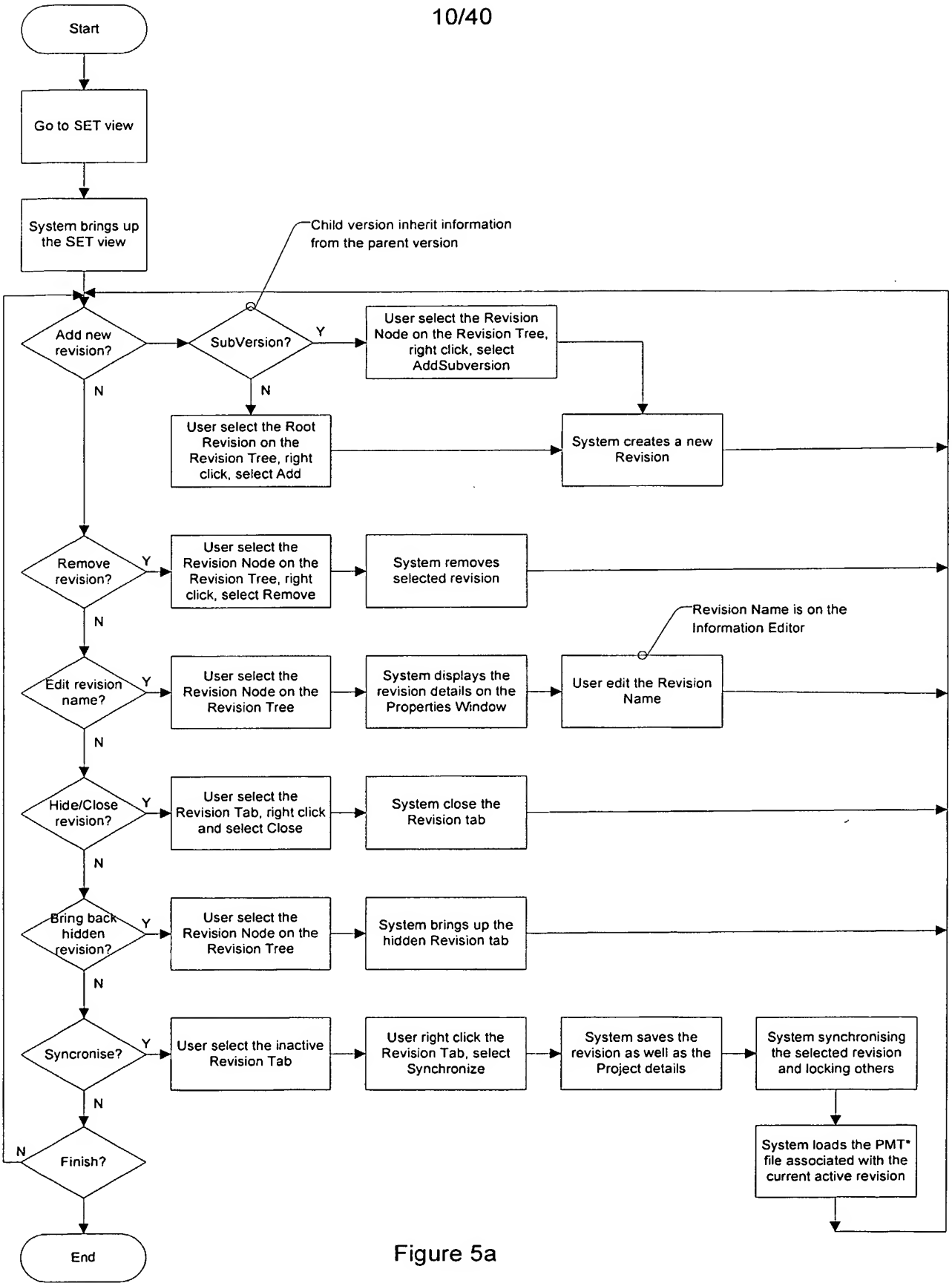
Start
Go to SET view
System brings up the SET view
Child version inherit information from the parent version
Add new revision?
SubVersion?
Y
N
User select the Revision Node on the Revision Tree, right click, select AddSubversion
User select the Root Revision on the Revision Tree, right click, select Add
System creates a new Revision
Remove revision?
User select the Revision Node on the Revision Tree, right click, select Remove
System removes selected revision
Revision Name is on the Information Editor
Edit revision name?
User select the Revision Node on the Revision Tree
System displays the revision details on the Properties Window
User edit the Revision Name
Hide/Close revision?
User select the Revision Tab, right click and select Close
System close the Revision tab
Bring back hidden revision?
User select the Revision Node on the Revision Tree
System brings up the hidden Revision tab
Syncronise?
User select the inactive Revision Tab
User right click the Revision Tab, select Synchronize
System saves the revision as well as the Project details
System synchronising the selected revision and locking others
System loads the PMT* file associated with the current active revision
Finish?
End

Figure 5a

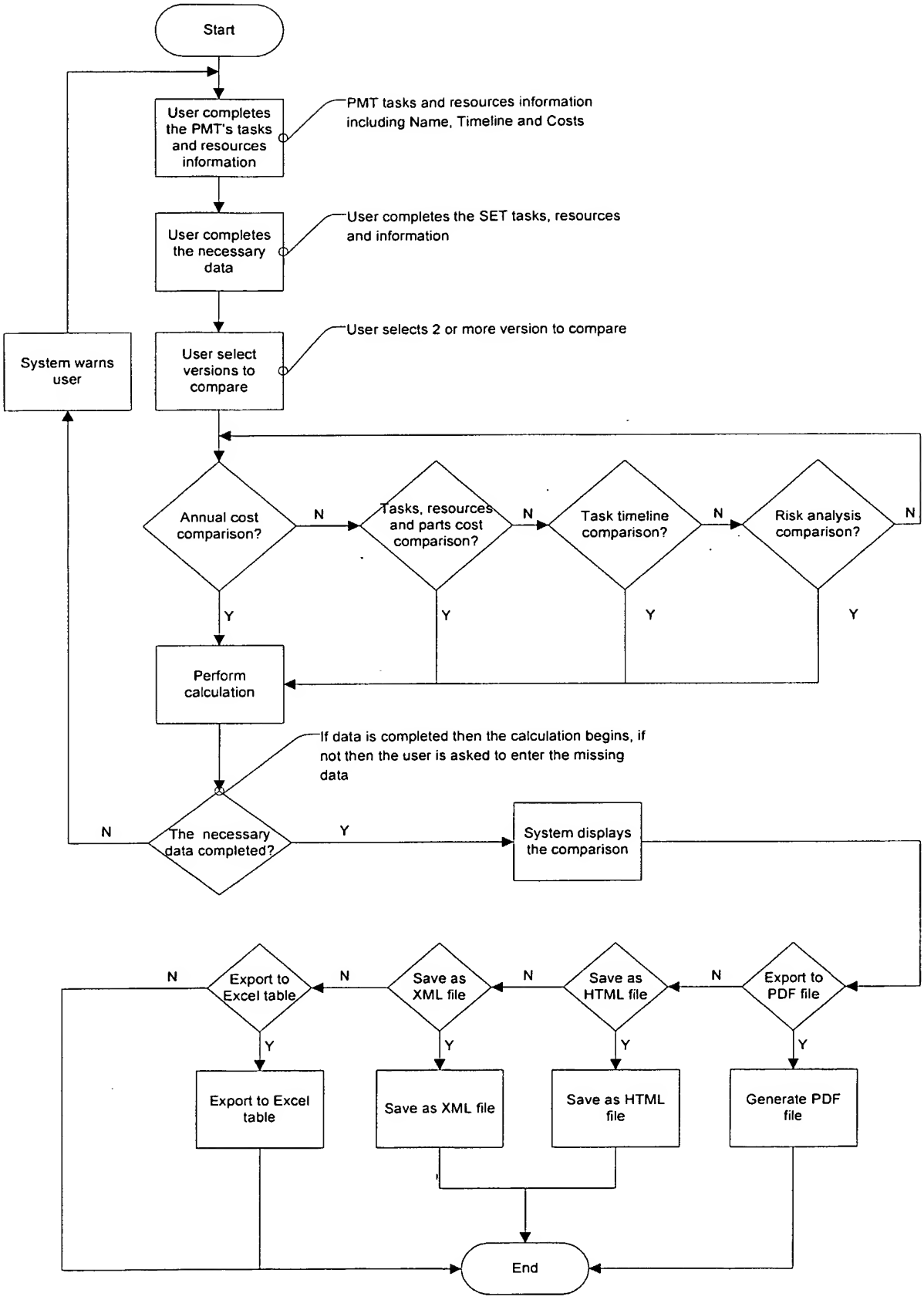
Start
User completes the PMT's tasks and resources information
PMT tasks and resources information including Name, Timeline and Costs
User completes the necessary data
User completes the SET tasks, resources and information
User select versions to compare
User selects 2 or more version to compare
System warns user
Annual cost comparison?
N
Tasks, resources and parts cost comparison?
N
Task timeline comparison?
N
Risk analysis comparison?
N
Y
Y
Y
Y
Perform calculation
If data is completed then the calculation begins, if not then the user is asked to enter the missing data
N
The necessary data completed?
Y
System displays the comparison
N
Export to Excel table
N
Save as XML file
N
Save as HTML file
N
Export to PDF file
Y
Y
Y
Y
Export to Excel table
Save as XML file
Save as HTML file
Generate PDF file
End

Figure 5b

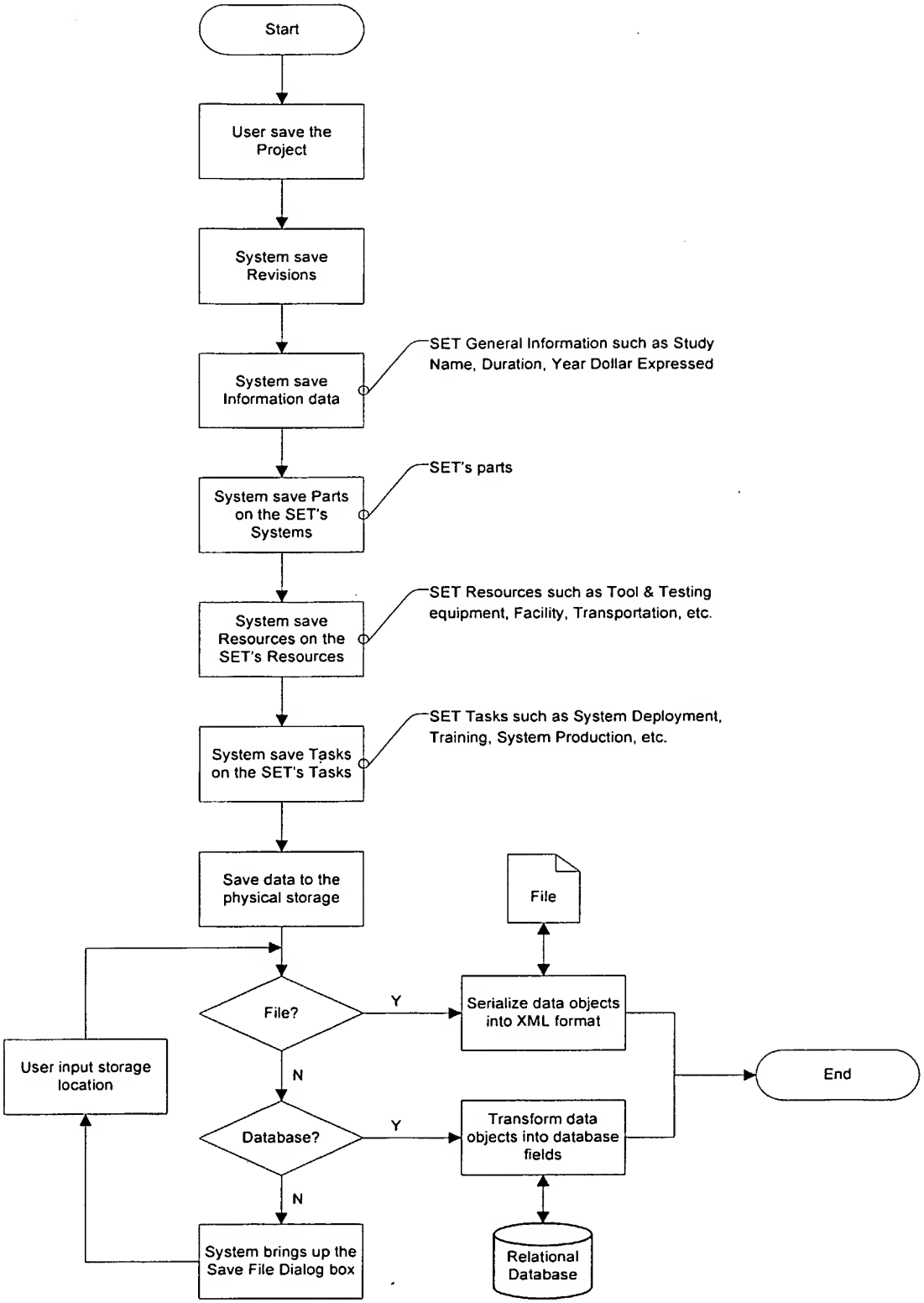
Start
User save the Project
System save Revisions
System save Information data
SET General Information such as Study Name, Duration, Year Dollar Expressed
System save Parts on the SET's Systems
SET's parts
System save Resources on the SET's Resources
SET Resources such as Tool & Testing equipment, Facility, Transportation, etc.
System save Tasks on the SET's Tasks
SET Tasks such as System Deployment, Training, System Production, etc.
Save data to the physical storage
File
File?
Y
Serialize data objects into XML format
N
User input storage location
Database?
Y
Transform data objects into database fields
End
N
System brings up the Save File Dialog box
Relational Database

Figure 5c

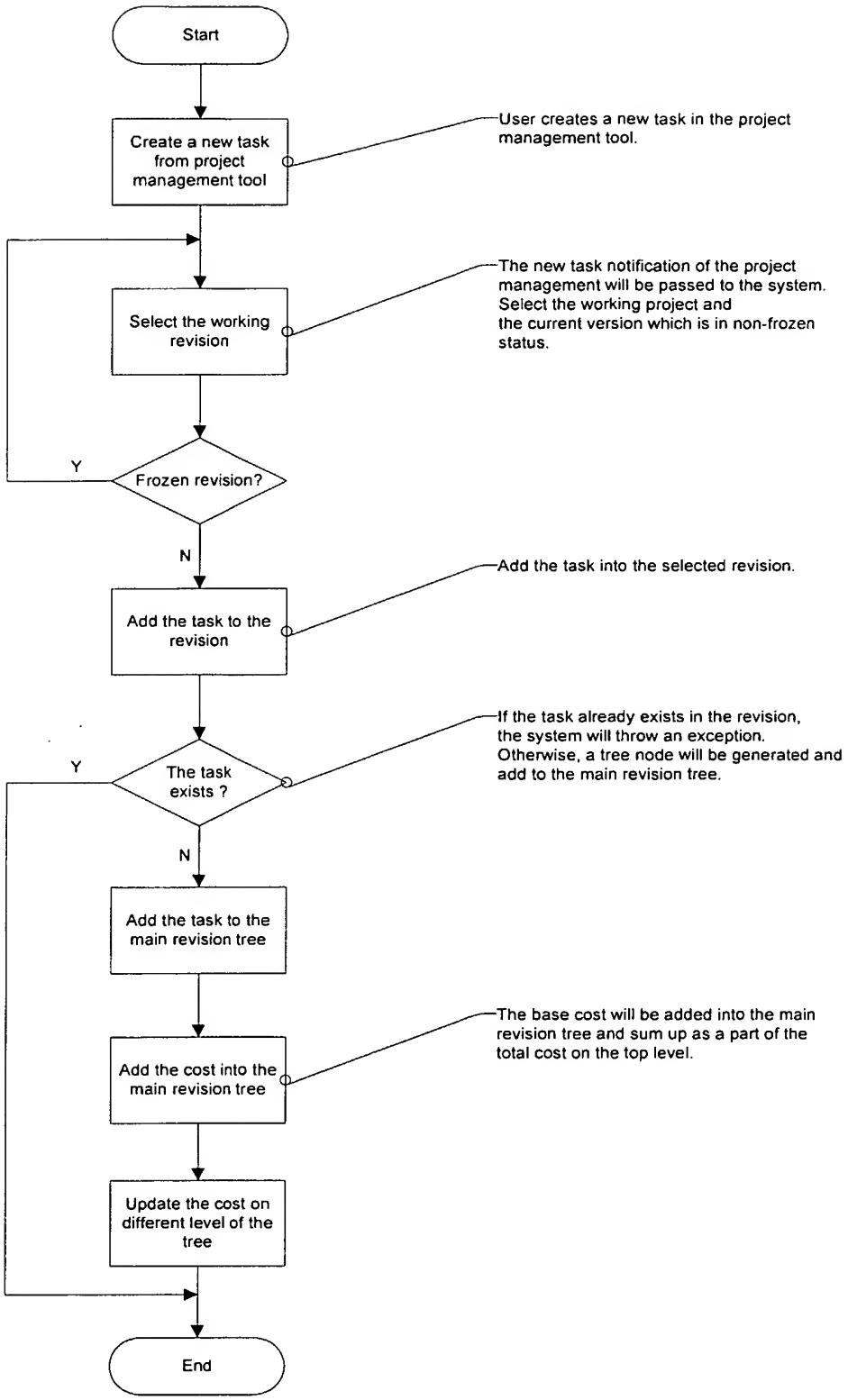
Start
Create a new task from project management tool
User creates a new task in the project management tool.
Select the working revision
The new task notification of the project management will be passed to the system. Select the working project and the current version which is in non-frozen status.
Frozen revision?
Y
N
Add the task to the revision
Add the task into the selected revision.
The task exists ?
If the task already exists in the revision, the system will throw an exception. Otherwise, a tree node will be generated and add to the main revision tree.
Add the task to the main revision tree
Add the cost into the main revision tree
The base cost will be added into the main revision tree and sum up as a part of the total cost on the top level.
Update the cost on different level of the tree
End

Figure 5d

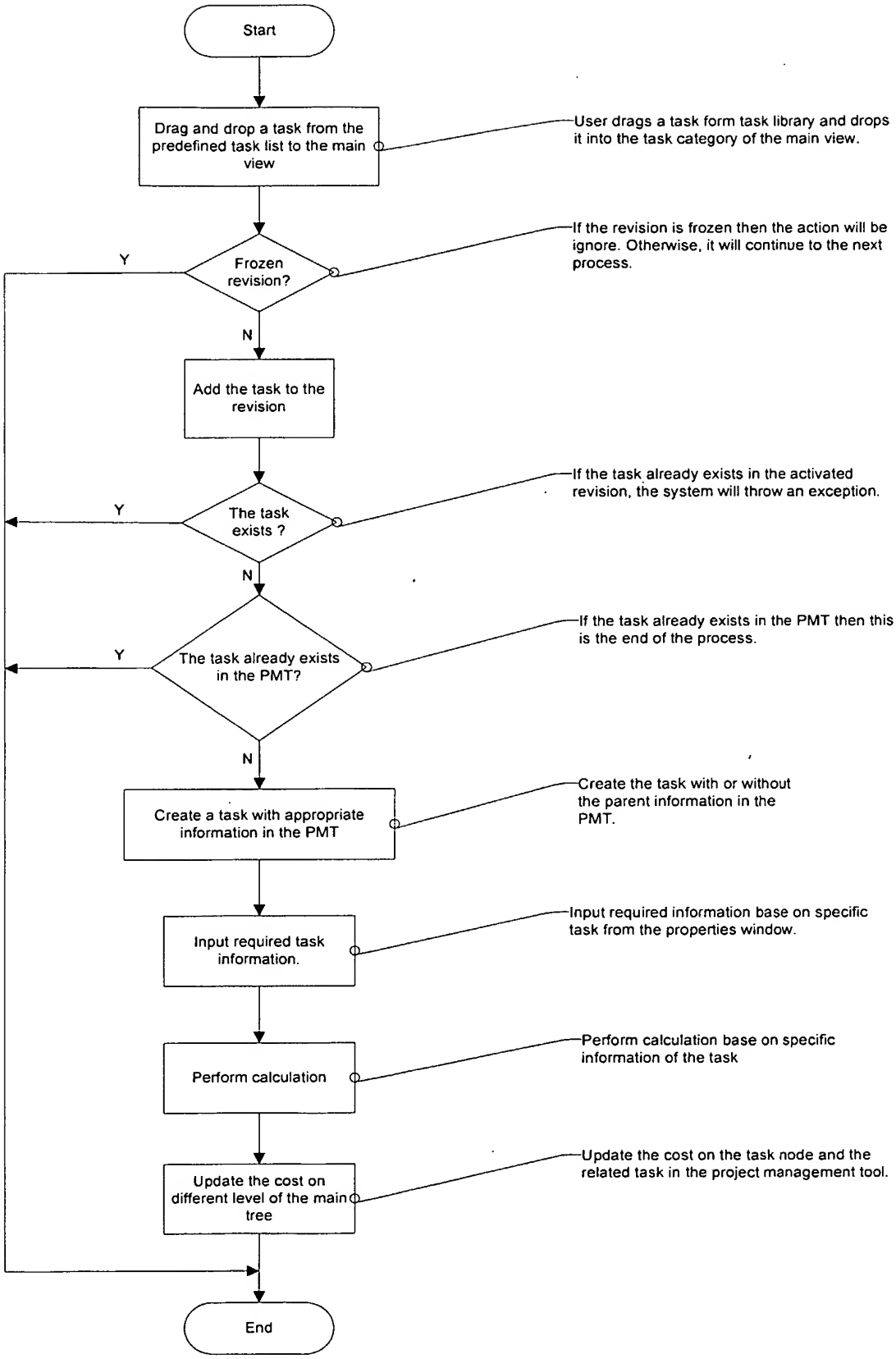
Start
Drag and drop a task from the predefined task list to the main view
User drags a task form task library and drops it into the task category of the main view.
Frozen revision?
Y
If the revision is frozen then the action will be ignore. Otherwise, it will continue to the next process.
N
Add the task to the revision
The task exists ?
Y
If the task already exists in the activated revision, the system will throw an exception.
N
The task already exists in the PMT?
Y
If the task already exists in the PMT then this is the end of the process.
N
Create a task with appropriate information in the PMT
Create the task with or without the parent information in the PMT.
Input required task information.
Input required information base on specific task from the properties window.
Perform calculation
Perform calculation base on specific information of the task
Update the cost on different level of the main tree
Update the cost on the task node and the related task in the project management tool.
End

Figure 5e

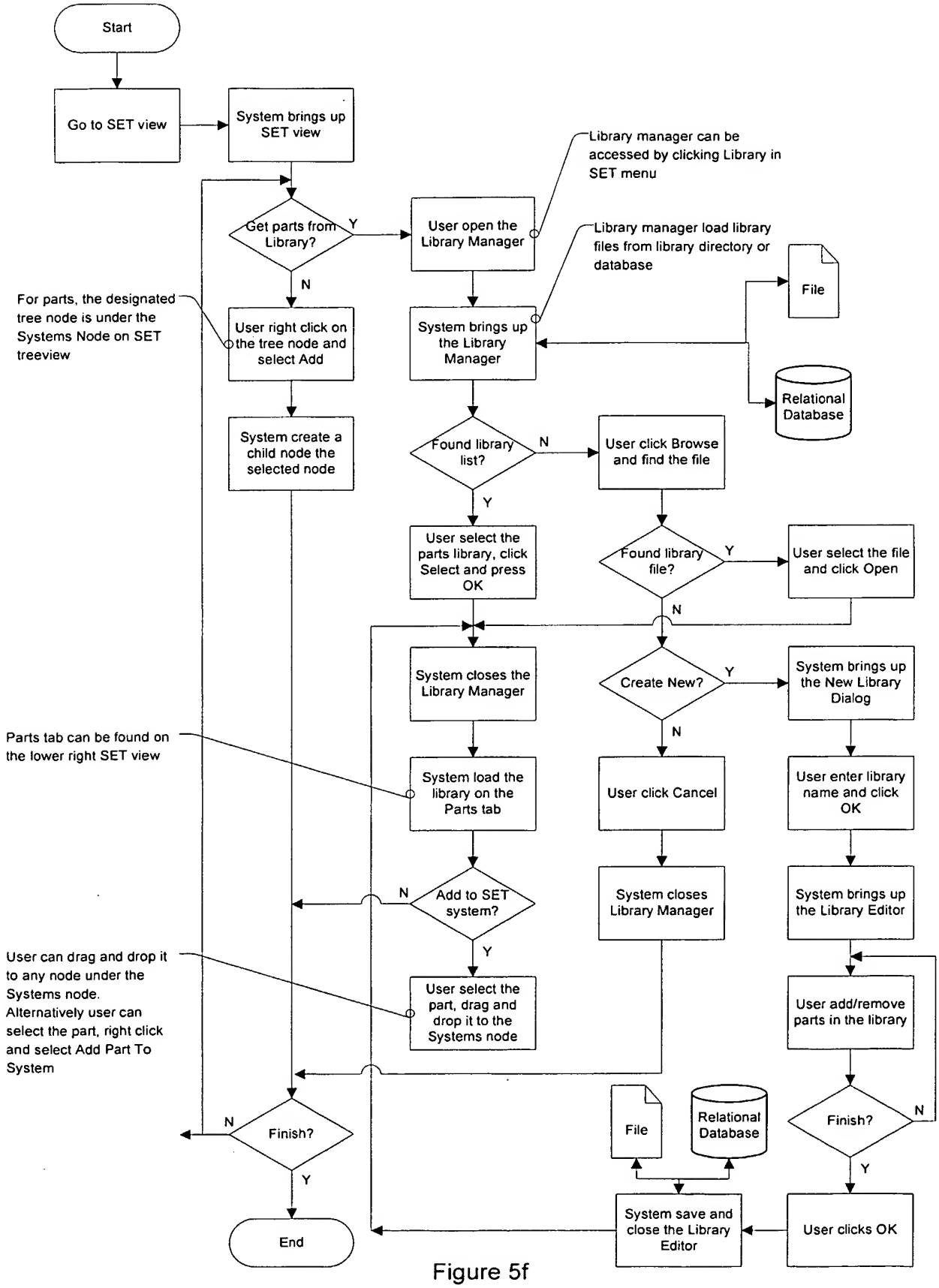
Start
Go to SET view
System brings up SET view
Get parts from Library?
Y
N
User open the Library Manager
Library manager can be accessed by clicking Library in SET menu
Library manager load library files from library directory or database
File
Relational Database
For parts, the designated tree node is under the Systems Node on SET treeview
User right click on the tree node and select Add
System brings up the Library Manager
System create a child node the selected node
Found library list?
N
Y
User click Browse and find the file
User select the parts library, click Select and press OK
Found library file?
Y
N
User select the file and click Open
System closes the Library Manager
Create New?
Y
N
System brings up the New Library Dialog
Parts tab can be found on the lower right SET view
System load the library on the Parts tab
User click Cancel
User enter library name and click OK
Add to SET system?
N
Y
System closes Library Manager
System brings up the Library Editor
User can drag and drop it to any node under the Systems node. Alternatively user can select the part, right click and select Add Part To System
User select the part, drag and drop it to the Systems node
User add/remove parts in the library
Finish?
N
Y
File
Relational Database
Finish?
N
Y
End
System save and close the Library Editor
User clicks OK

Figure 5f

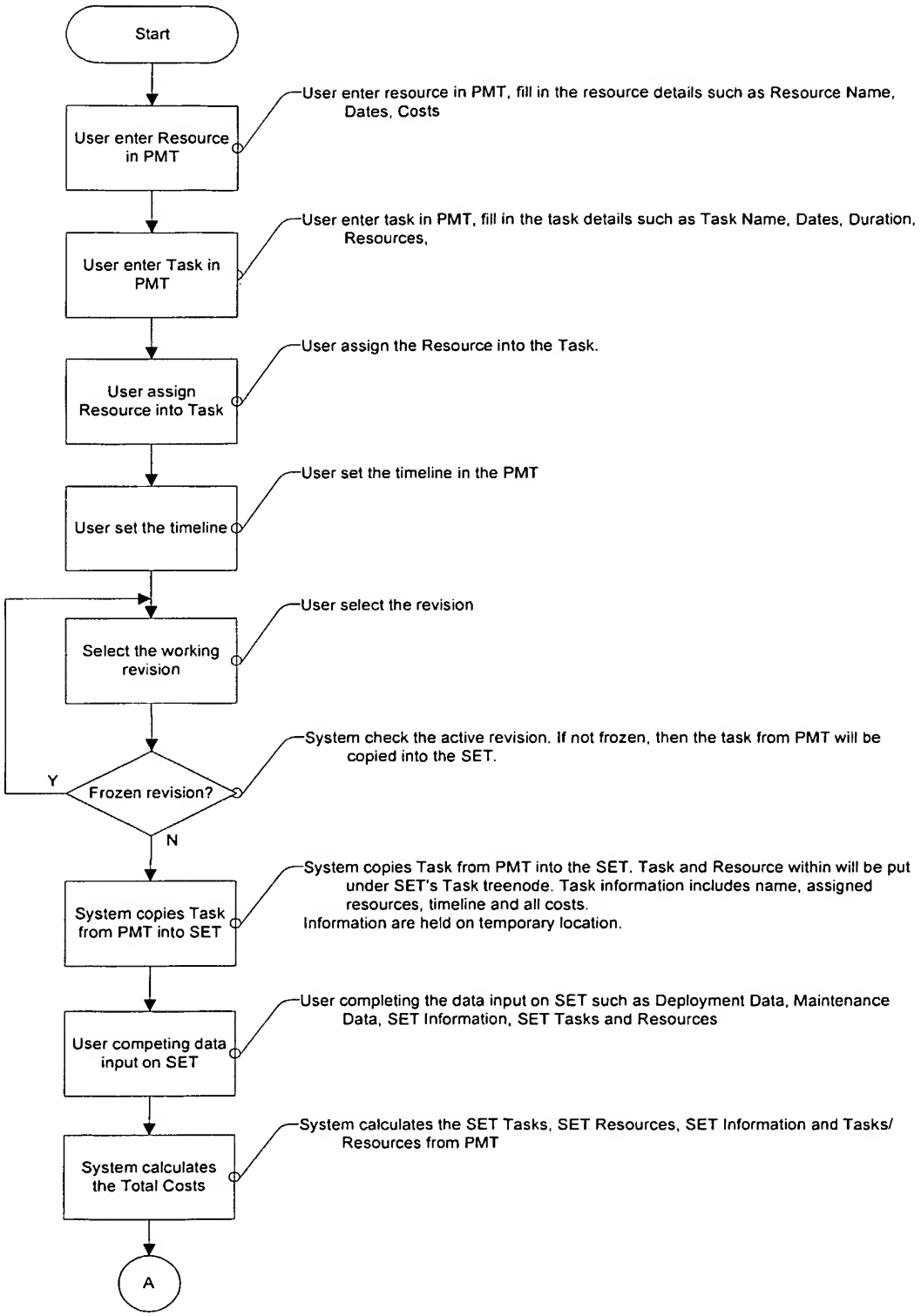
Start
User enter Resource in PMT
User enter resource in PMT, fill in the resource details such as Resource Name, Dates, Costs
User enter Task in PMT
User enter task in PMT, fill in the task details such as Task Name, Dates, Duration, Resources,
User assign Resource into Task
User assign the Resource into the Task.
User set the timeline
User set the timeline in the PMT
Select the working revision
User select the revision
Frozen revision?
Y
N
System check the active revision. If not frozen, then the task from PMT will be copied into the SET.
System copies Task from PMT into SET
System copies Task from PMT into the SET. Task and Resource within will be put under SET's Task treenode. Task information includes name, assigned resources, timeline and all costs.
Information are held on temporary location.
User competing data input on SET
User completing the data input on SET such as Deployment Data, Maintenance Data, SET Information, SET Tasks and Resources
System calculates the Total Costs
System calculates the SET Tasks, SET Resources, SET Information and Tasks/ Resources from PMT
A

Figure 6a

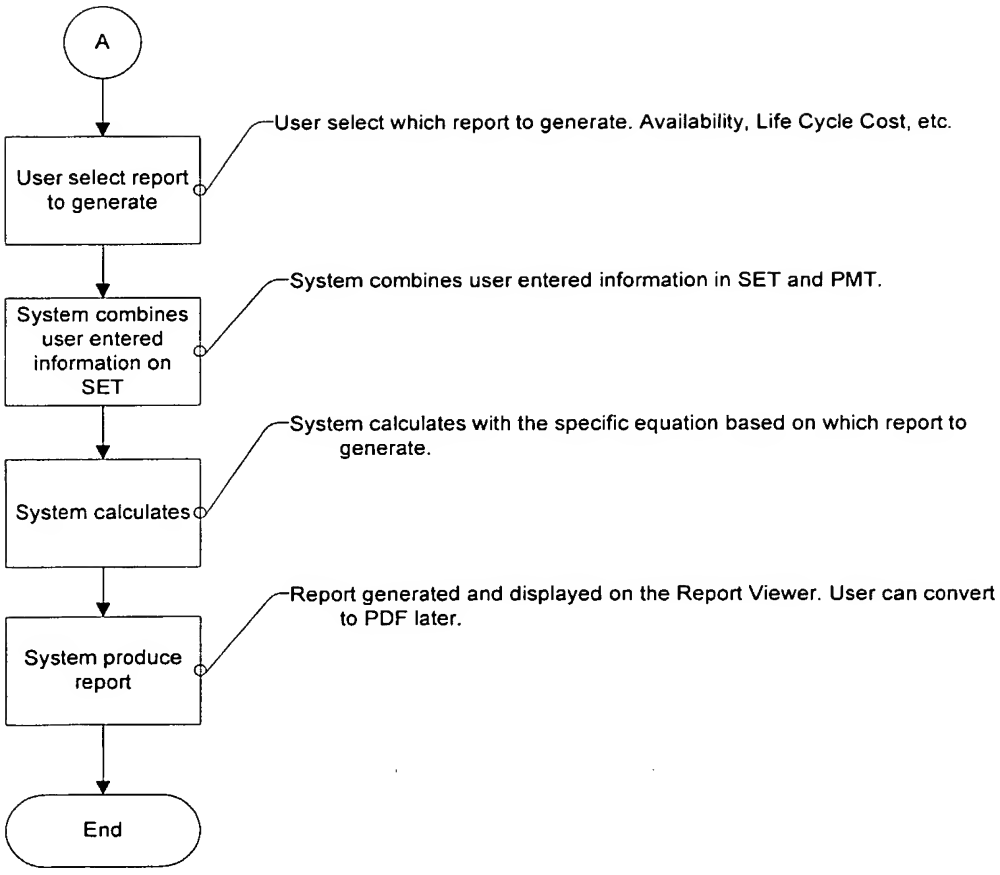
A
User select report to generate
User select which report to generate. Availability, Life Cycle Cost, etc.
System combines user entered information on SET
System combines user entered information in SET and PMT.
System calculates
System calculates with the specific equation based on which report to generate.
System produce report
Report generated and displayed on the Report Viewer. User can convert to PDF later.
End

Figure 6b

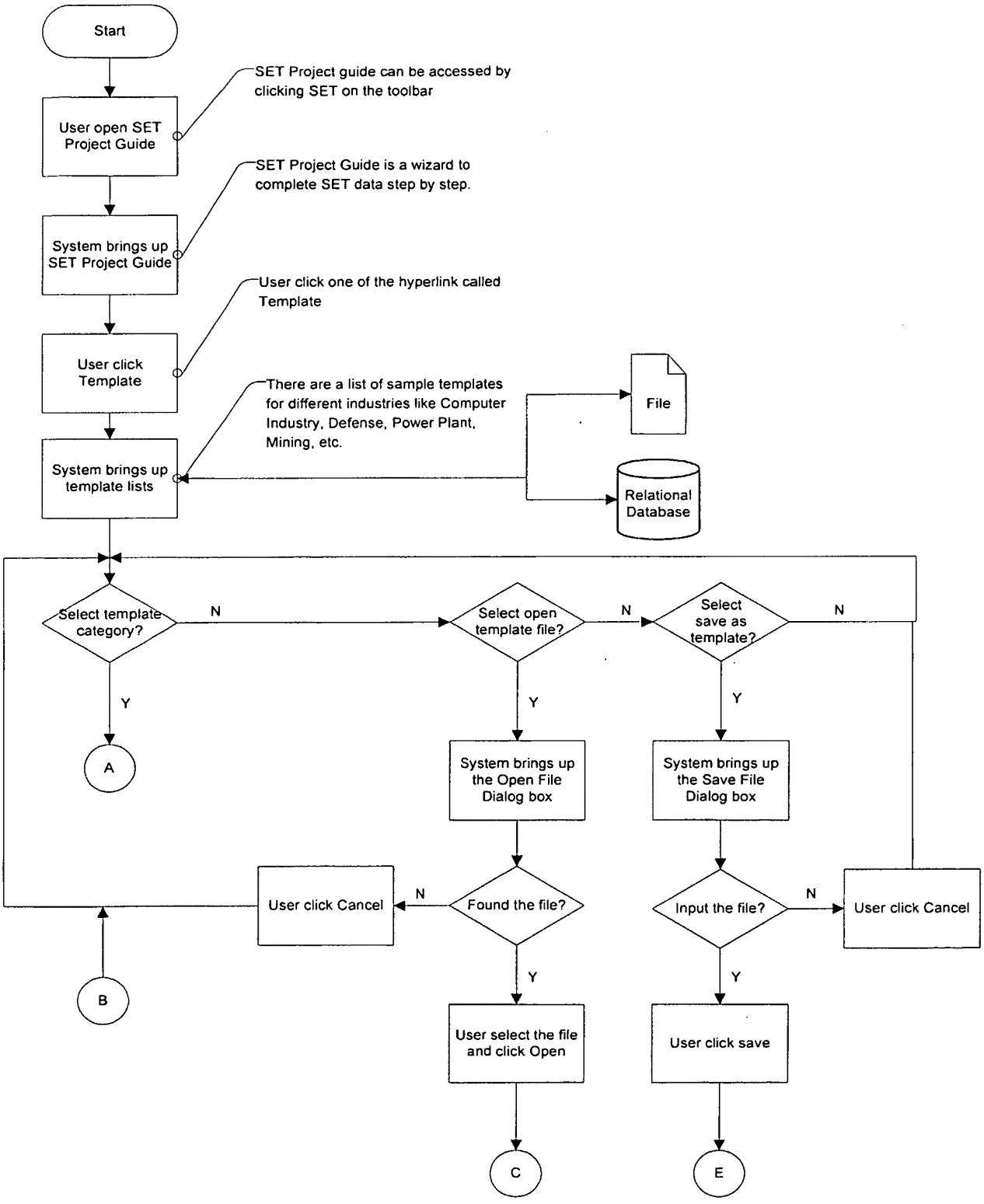
Start
User open SET Project Guide
SET Project guide can be accessed by clicking SET on the toolbar
System brings up SET Project Guide
SET Project Guide is a wizard to complete SET data step by step.
User click Template
User click one of the hyperlink called Template
System brings up template lists
There are a list of sample templates for different industries like Computer Industry, Defense, Power Plant, Mining, etc.
File
Relational Database
Select template category?
N
Y
A
Select open template file?
N
Y
System brings up the Open File Dialog box
Select save as template?
N
Y
System brings up the Save File Dialog box
Found the file?
N
User click Cancel
Y
User select the file and click Open
Input the file?
N
User click Cancel
Y
User click save
B
C
E

Figure 7a

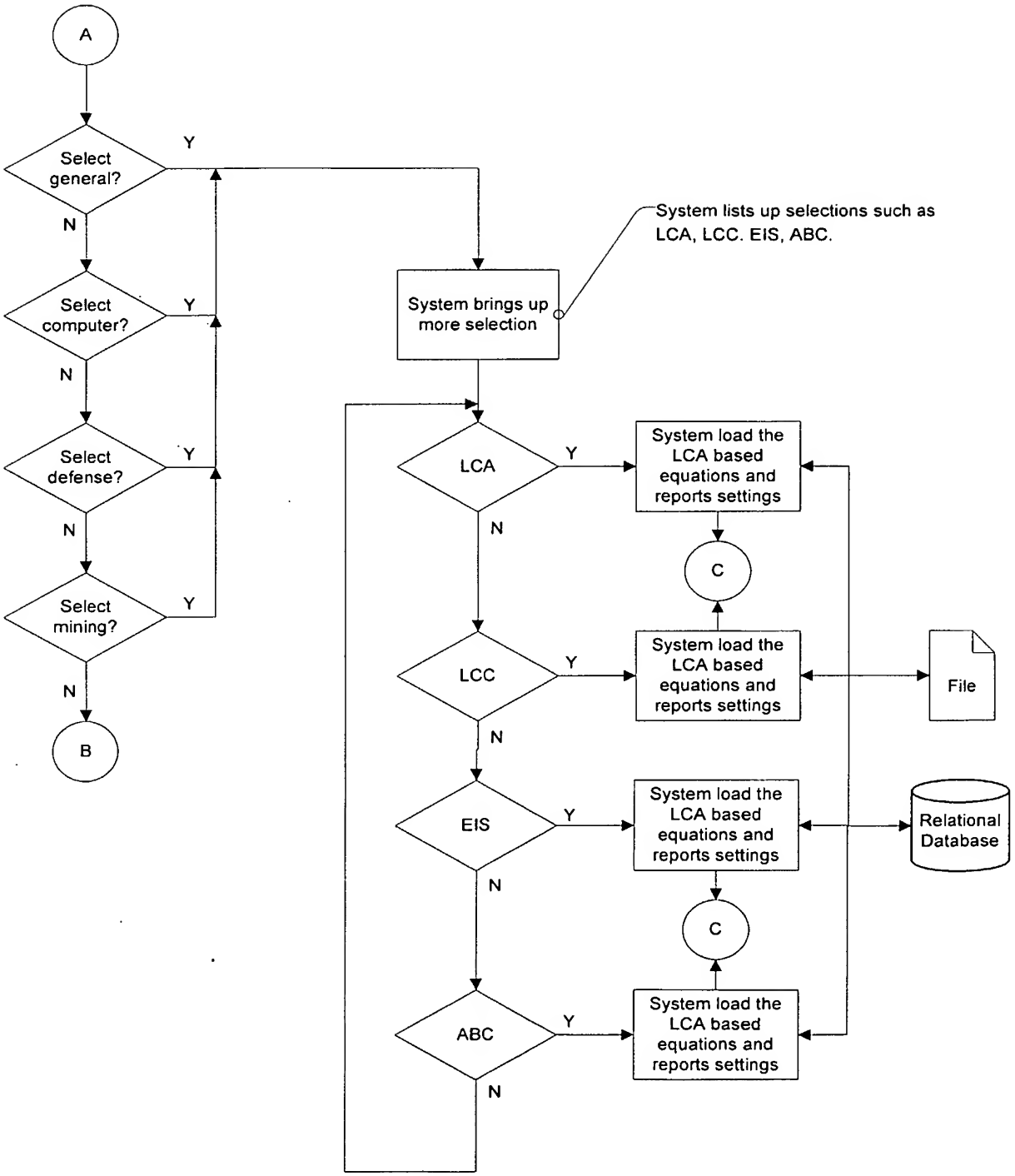
A
Select general?
Y
N
Select computer?
Y
N
Select defense?
Y
N
Select mining?
Y
N
B
System brings up more selection
System lists up selections such as LCA, LCC. EIS, ABC.
LCA
Y
N
System load the LCA based equations and reports settings
C
LCC
Y
N
System load the LCA based equations and reports settings
File
EIS
Y
N
System load the LCA based equations and reports settings
Relational Database
C
ABC
Y
N
System load the LCA based equations and reports settings

Figure 7b

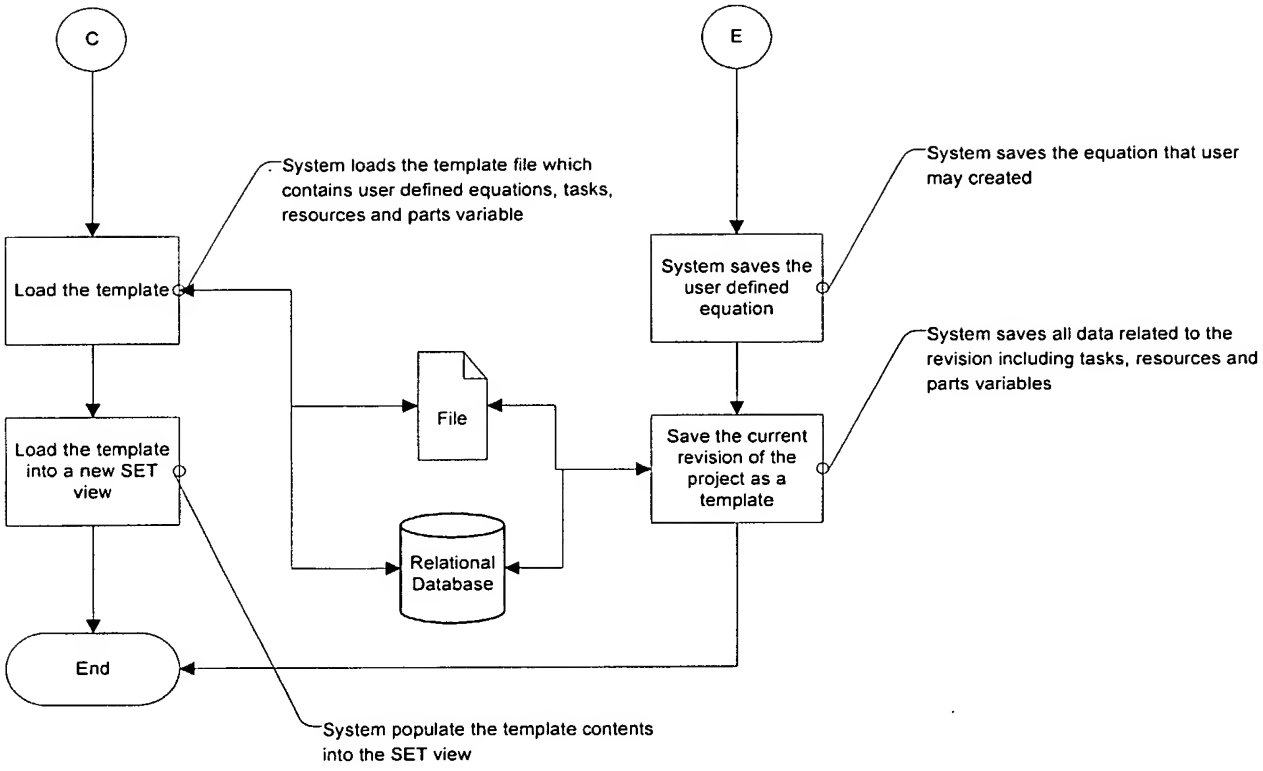
C
E
System loads the template file which contains user defined equations, tasks, resources and parts variable
System saves the equation that user may created
Load the template
System saves the user defined equation
System saves all data related to the revision including tasks, resources and parts variables
File
Load the template into a new SET view
Save the current revision of the project as a template
Relational Database
End
System populate the template contents into the SET view

Figure 7c

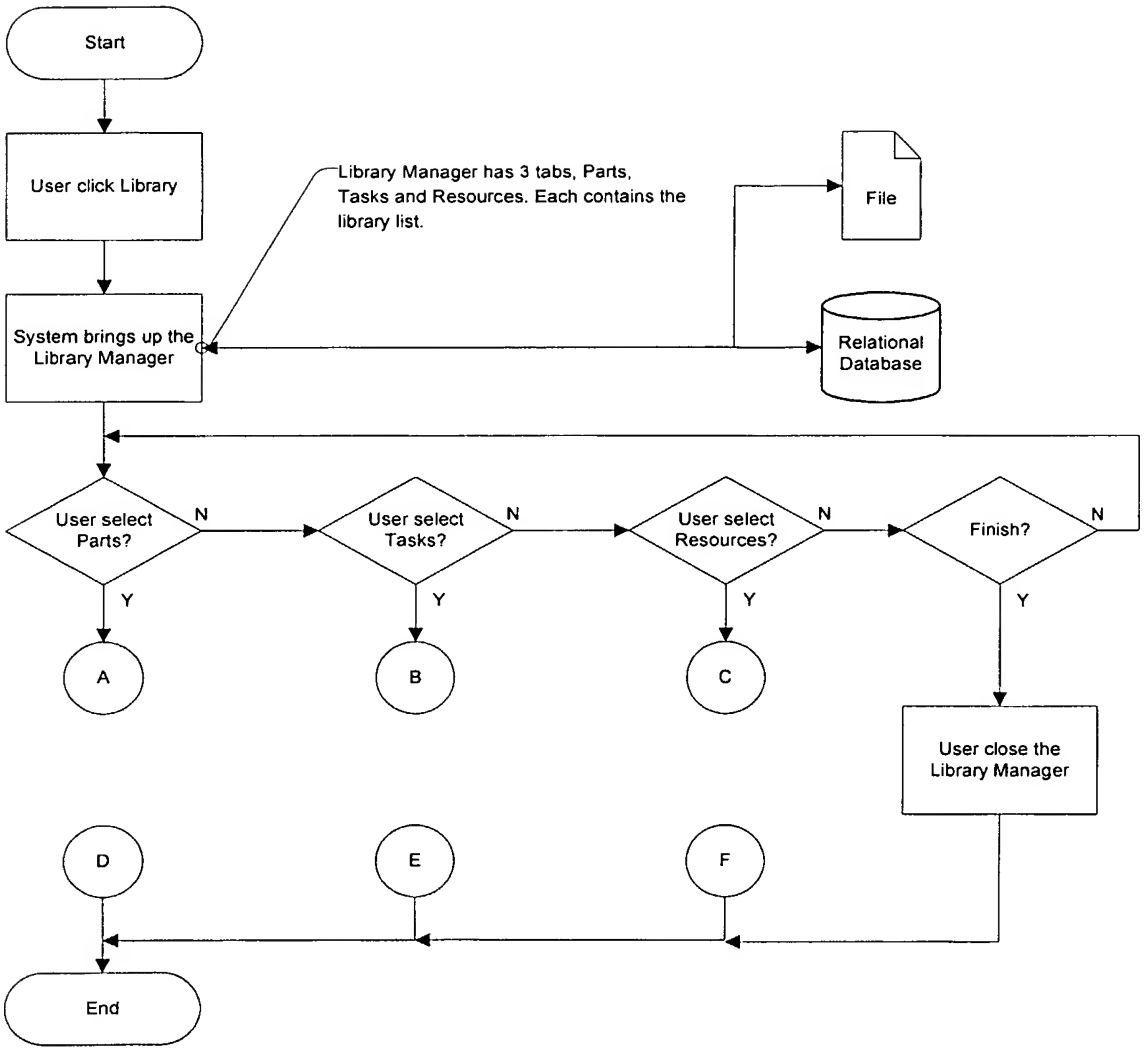
Start
User click Library
Library Manager has 3 tabs, Parts, Tasks and Resources. Each contains the library list.
File
System brings up the Library Manager
Relational Database
User select Parts?
N
User select Tasks?
N
User select Resources?
N
Finish?
N
Y
Y
Y
Y
A
B
C
User close the Library Manager
D
E
F
End

Figure 8a

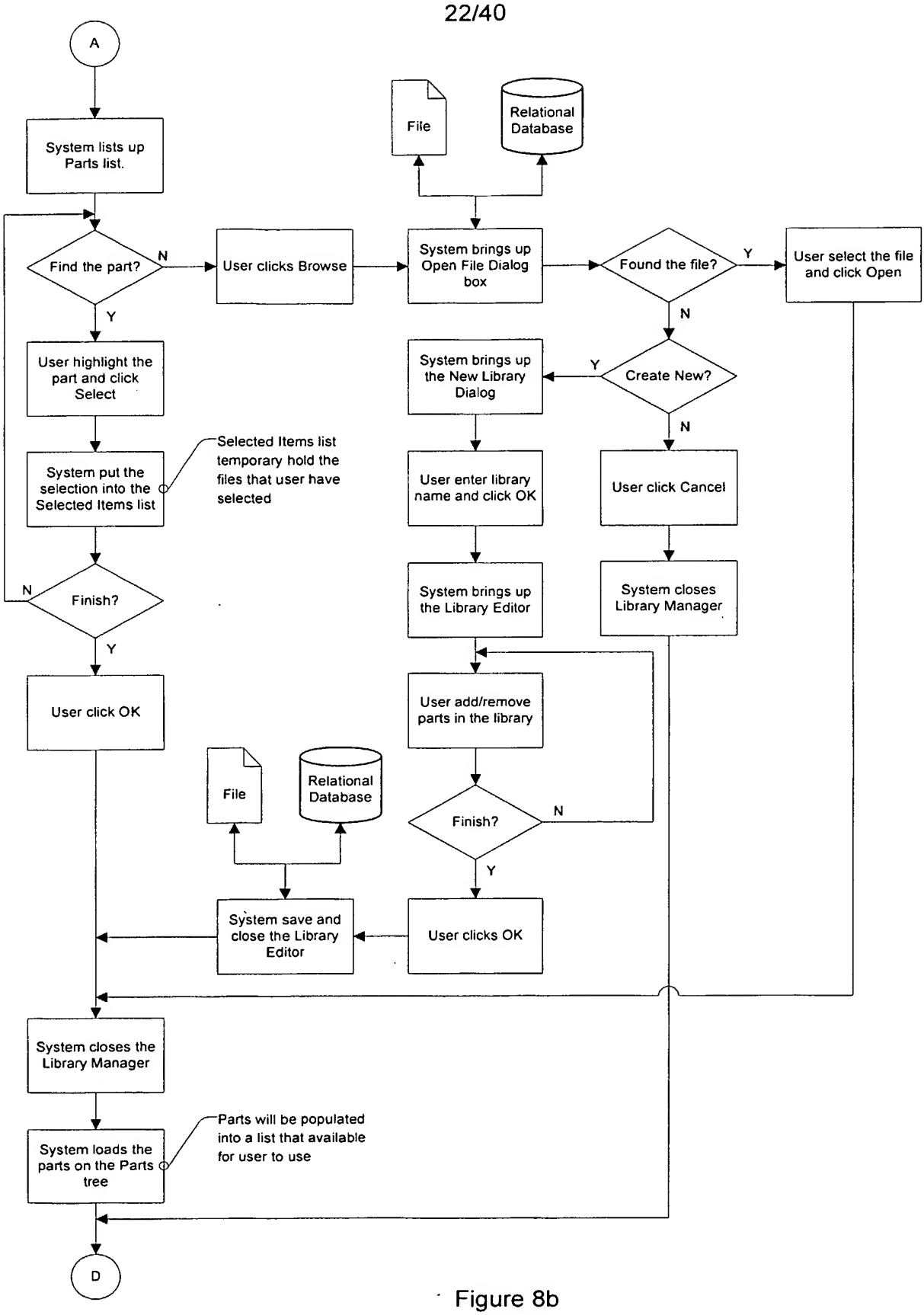
A
System lists up Parts list.
File
Relational Database
Find the part?
N
User clicks Browse
System brings up Open File Dialog box
Found the file?
Y
User select the file and click Open
Y
N
User highlight the part and click Select
System brings up the New Library Dialog
Y
Create New?
N
Selected Items list temporary hold the files that user have selected
System put the selection into the Selected Items list
User enter library name and click OK
User click Cancel
N
Finish?
System brings up the Library Editor
System closes Library Manager
Y
User click OK
User add/remove parts in the library
File
Relational Database
Finish?
N
Y
System save and close the Library Editor
User clicks OK
System closes the Library Manager
Parts will be populated into a list that available for user to use
System loads the parts on the Parts tree
D

Figure 8b

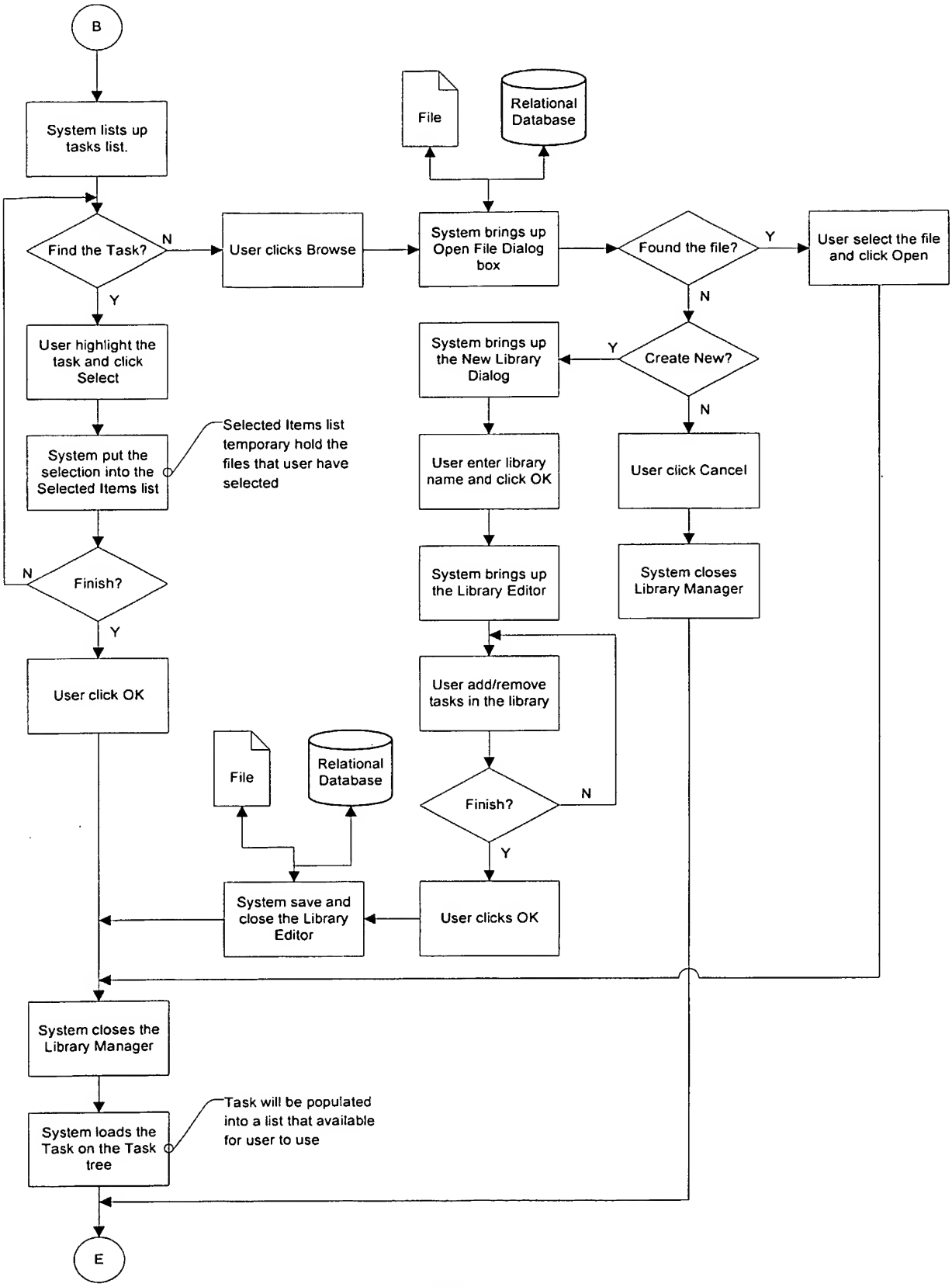
B
System lists up tasks list.
Find the Task?
N
Y
User clicks Browse
File
Relational Database
System brings up Open File Dialog box
Found the file?
Y
N
User select the file and click Open
User highlight the task and click Select
System brings up the New Library Dialog
Create New?
Y
N
System put the selection into the Selected Items list
Selected Items list temporary hold the files that user have selected
User enter library name and click OK
User click Cancel
Finish?
N
Y
System brings up the Library Editor
System closes Library Manager
User click OK
User add/remove tasks in the library
File
Relational Database
Finish?
N
Y
System save and close the Library Editor
User clicks OK
System closes the Library Manager
System loads the Task on the Task tree
Task will be populated into a list that available for user to use
E

Figure 8c

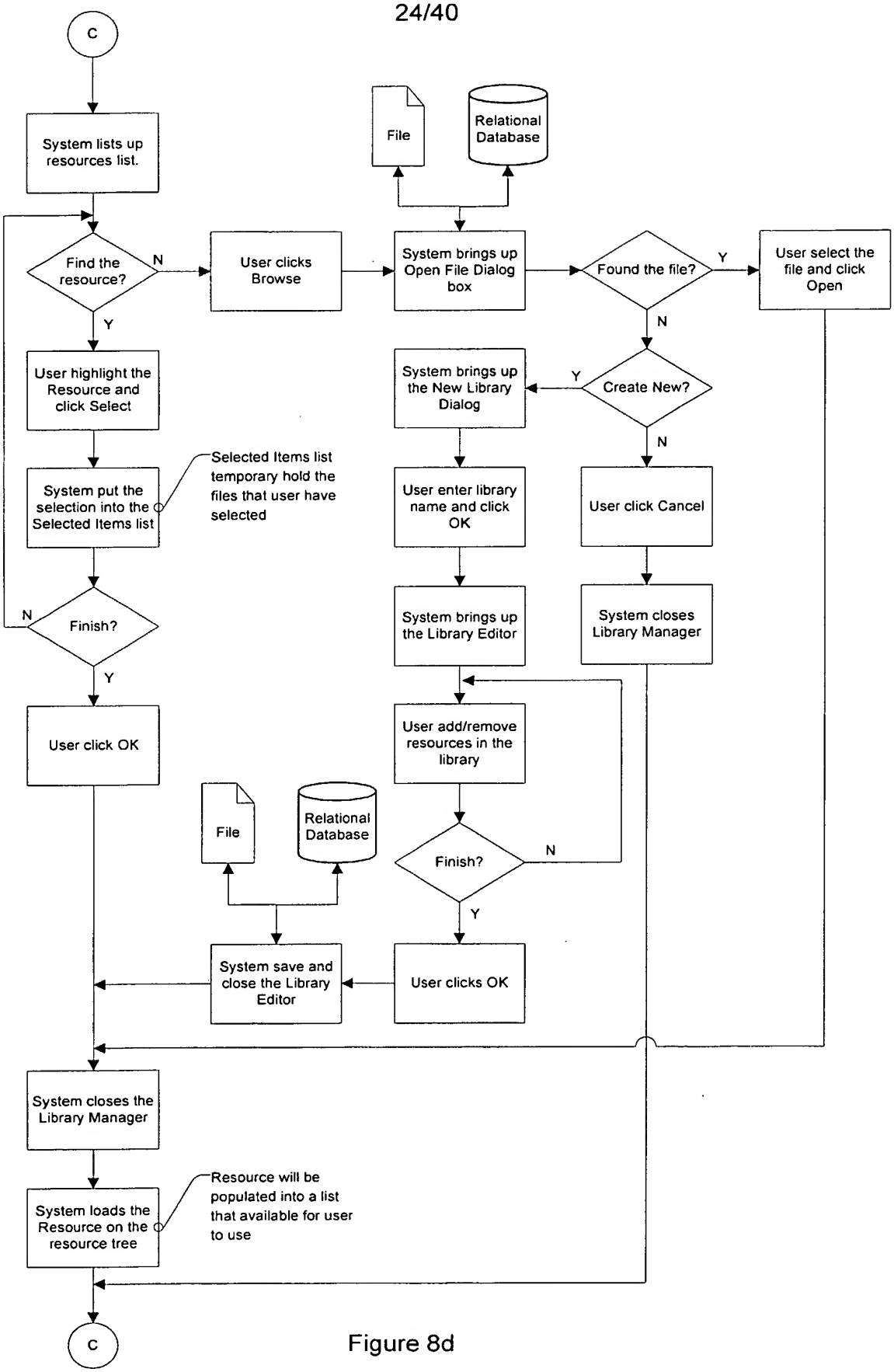
C
System lists up resources list.
File
Relational Database
Find the resource?
N
User clicks Browse
System brings up Open File Dialog box
Found the file?
Y
User select the file and click Open
Y
N
User highlight the Resource and click Select
System brings up the New Library Dialog
Y
Create New?
N
Selected Items list temporary hold the files that user have selected
System put the selection into the Selected Items list
User enter library name and click OK
User click Cancel
N
Finish?
System brings up the Library Editor
System closes Library Manager
Y
User click OK
User add/remove resources in the library
File
Relational Database
Finish?
N
Y
System save and close the Library Editor
User clicks OK
System closes the Library Manager
Resource will be populated into a list that available for user to use
System loads the Resource on the resource tree
C

Figure 8d

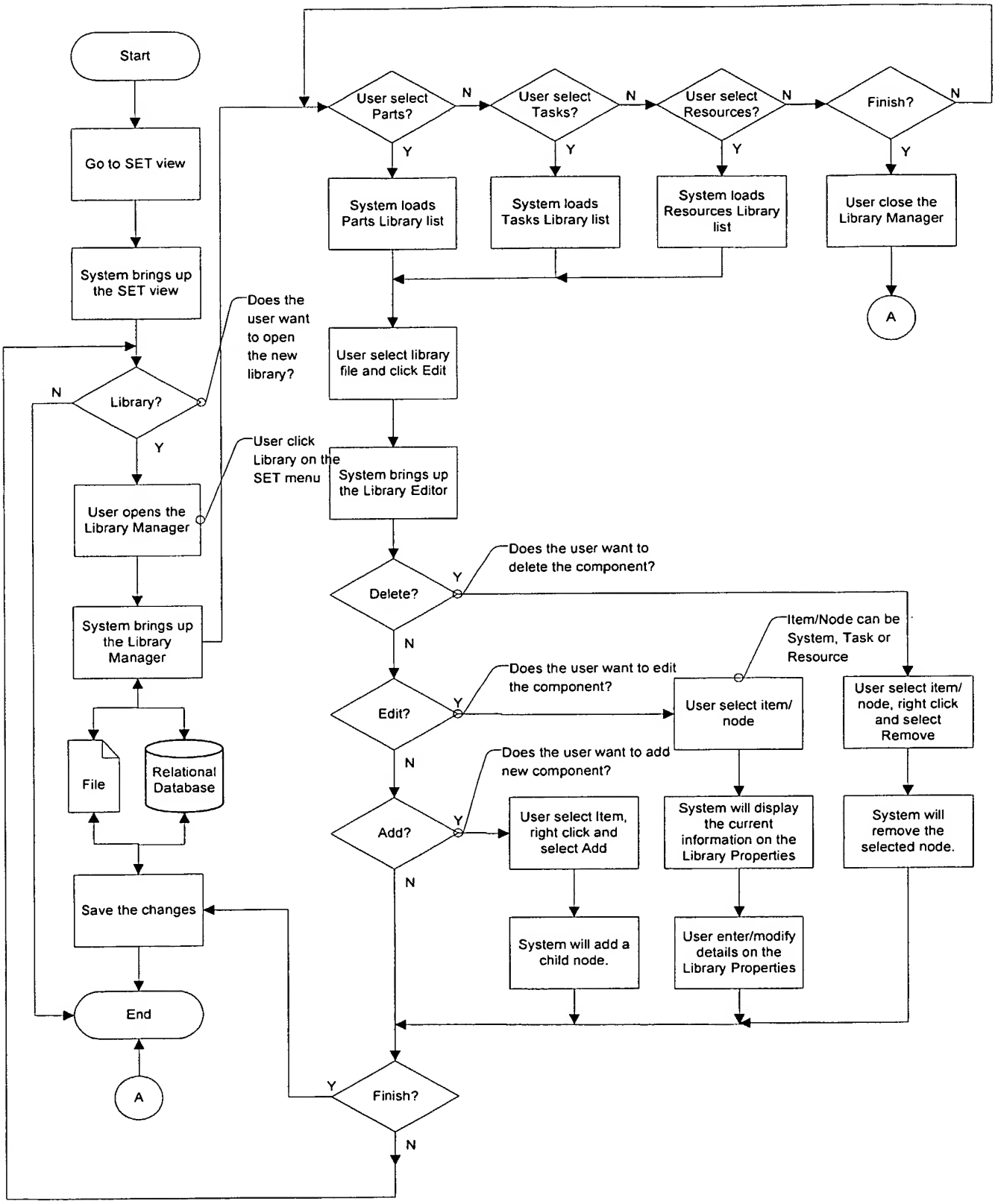
Start
Go to SET view
System brings up the SET view
Library?
N
Y
Does the user want to open the new library?
User opens the Library Manager
User click Library on the SET menu
System brings up the Library Manager
File
Relational Database
Save the changes
End
A
User select Parts?
User select Tasks?
User select Resources?
Finish?
System loads Parts Library list
System loads Tasks Library list
System loads Resources Library list
User close the Library Manager
A
User select library file and click Edit
System brings up the Library Editor
Delete?
Does the user want to delete the component?
Edit?
Does the user want to edit the component?
Item/Node can be System, Task or Resource
User select item/ node
User select item/ node, right click and select Remove
Add?
Does the user want to add new component?
User select Item, right click and select Add
System will display the current information on the Library Properties
System will remove the selected node.
System will add a child node.
User enter/modify details on the Library Properties
Finish?

Figure 8e

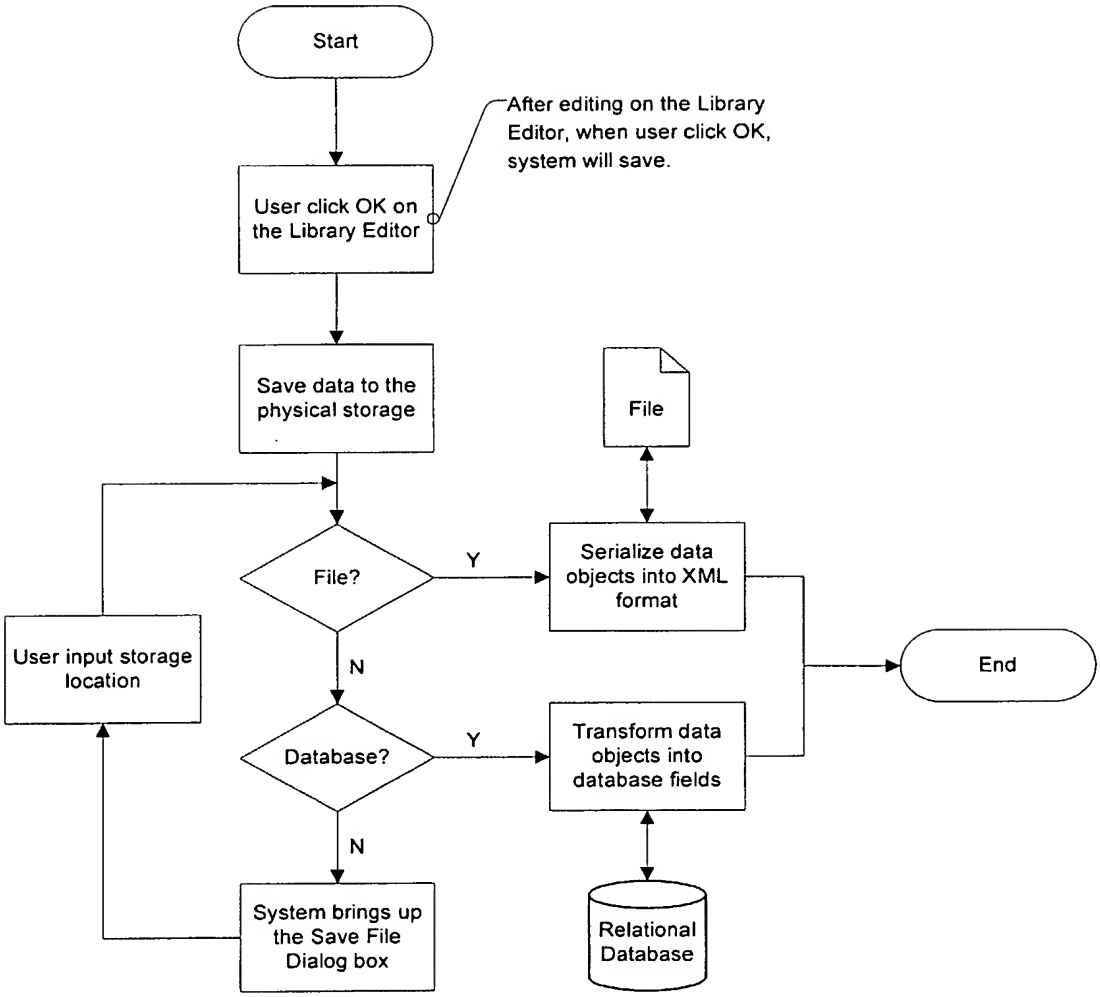
Start
After editing on the Library Editor, when user click OK, system will save.
User click OK on the Library Editor
Save data to the physical storage
File
File?
Y
Serialize data objects into XML format
User input storage location
N
End
Database?
Y
Transform data objects into database fields
N
System brings up the Save File Dialog box
Relational Database

Figure 8f

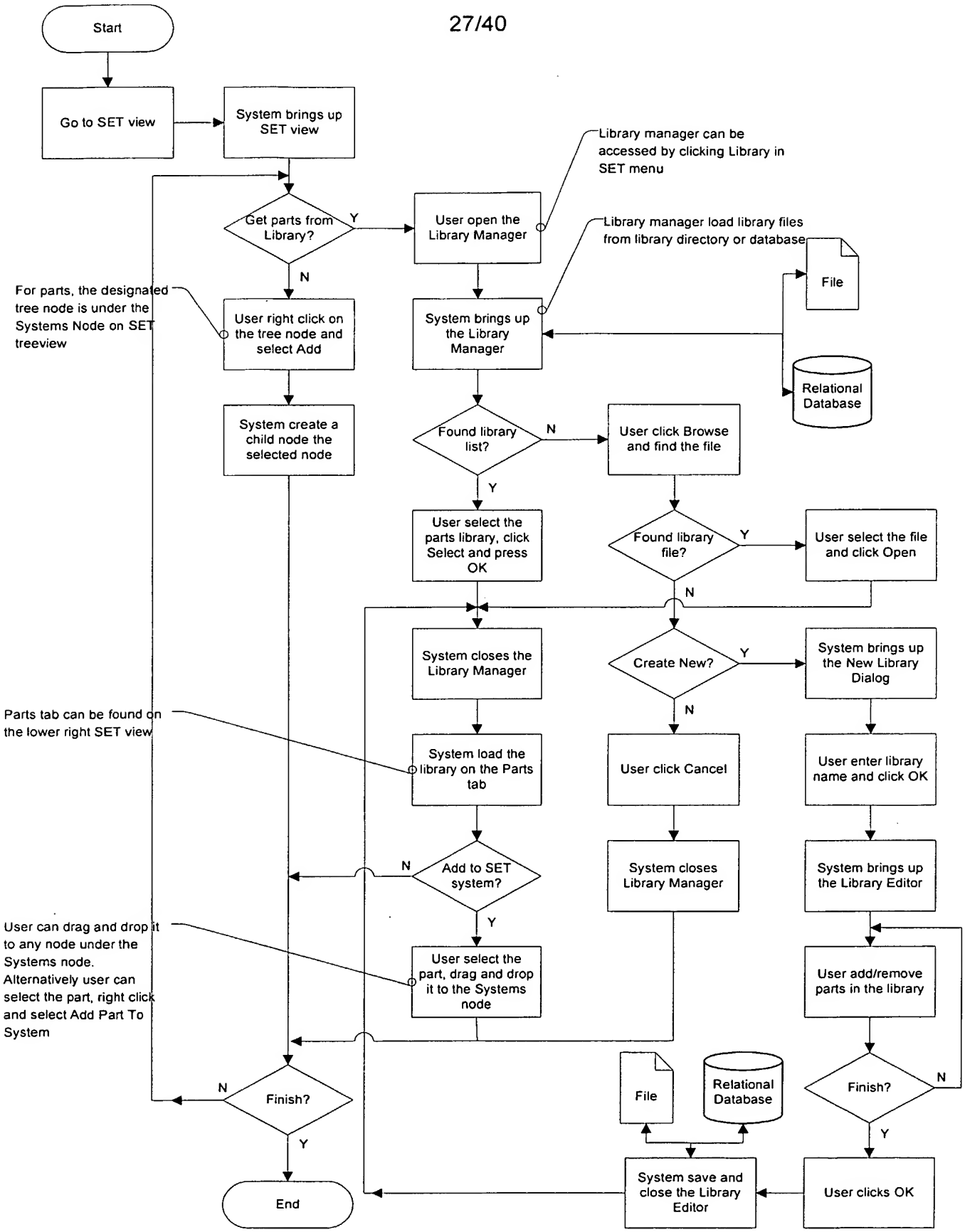
Start
Go to SET view
System brings up SET view
Get parts from Library?
Y
N
User open the Library Manager
Library manager can be accessed by clicking Library in SET menu
Library manager load library files from library directory or database
File
Relational Database
For parts, the designated tree node is under the Systems Node on SET treeview
User right click on the tree node and select Add
System brings up the Library Manager
System create a child node the selected node
Found library list?
N
Y
User click Browse and find the file
User select the parts library, click Select and press OK
Found library file?
Y
N
User select the file and click Open
System closes the Library Manager
Create New?
Y
N
System brings up the New Library Dialog
Parts tab can be found on the lower right SET view
System load the library on the Parts tab
User click Cancel
User enter library name and click OK
Add to SET system?
N
Y
System closes Library Manager
System brings up the Library Editor
User can drag and drop it to any node under the Systems node. Alternatively user can select the part, right click and select Add Part To System
User select the part, drag and drop it to the Systems node
User add/remove parts in the library
Finish?
N
Y
File
Relational Database
Finish?
N
Y
End
System save and close the Library Editor
User clicks OK

Figure 8g

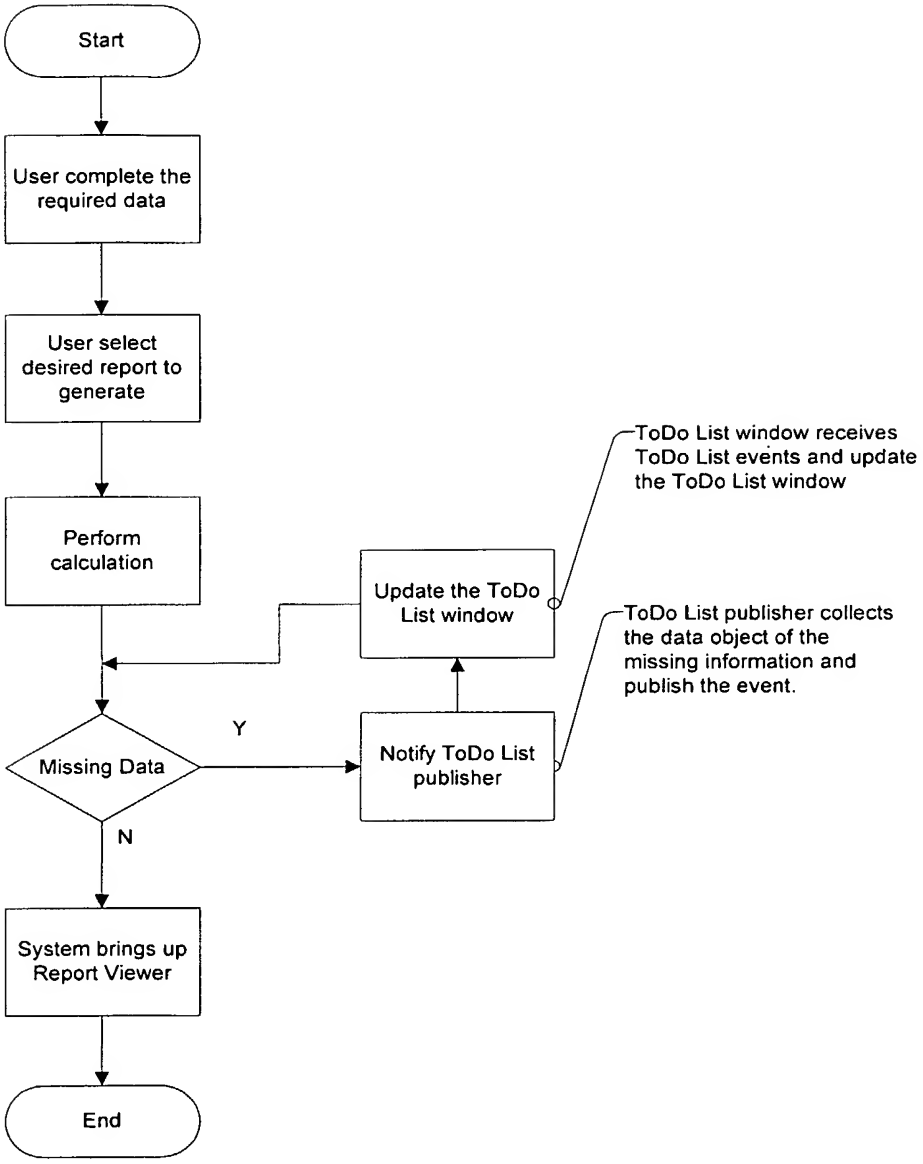
Start
User complete the required data
User select desired report to generate
Perform calculation
Missing Data
Y
N
Update the ToDo List window
Notify ToDo List publisher
ToDo List window receives ToDo List events and update the ToDo List window
ToDo List publisher collects the data object of the missing information and publish the event.
System brings up Report Viewer
End

Figure 9a

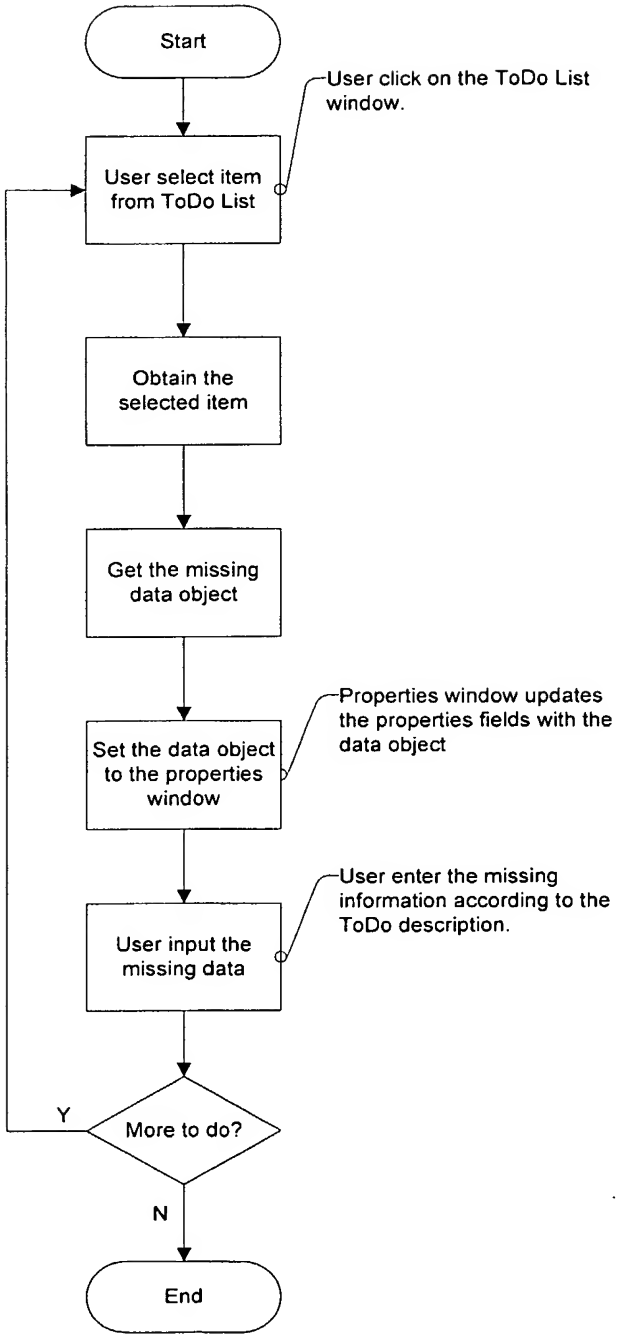
Start
User click on the ToDo List window.
User select item from ToDo List
Obtain the selected item
Get the missing data object
Properties window updates the properties fields with the data object
Set the data object to the properties window
User enter the missing information according to the ToDo description.
User input the missing data
Y
More to do?
N
End

Figure 9b

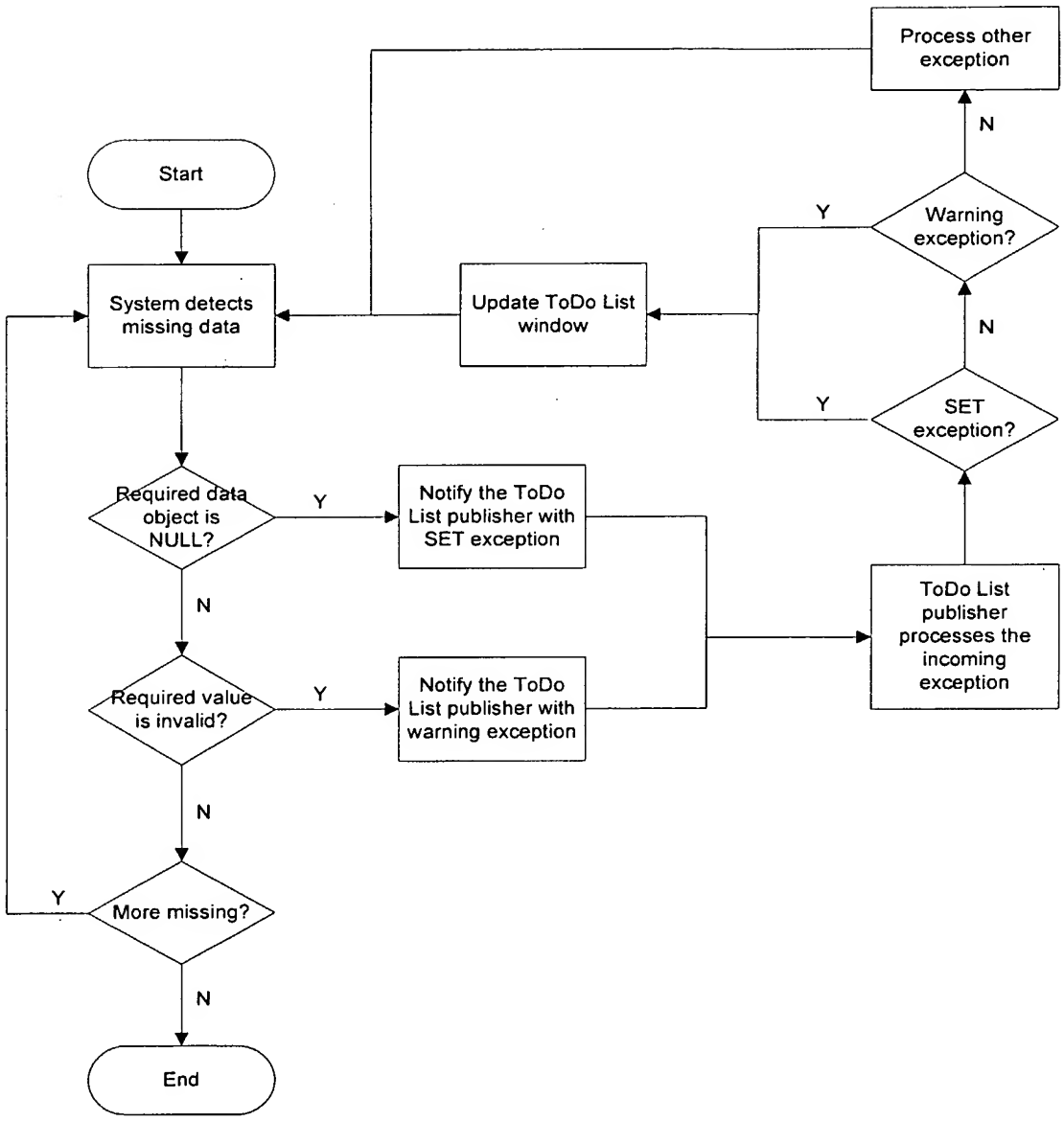
Process other exception
N
Start
Y
Warning exception?
System detects missing data
Update ToDo List window
N
Y
SET exception?
Required data object is NULL?
Y
Notify the ToDo List publisher with SET exception
N
ToDo List publisher processes the incoming exception
Required value is invalid?
Y
Notify the ToDo List publisher with warning exception
N
Y
More missing?
N
End

Figure 9c

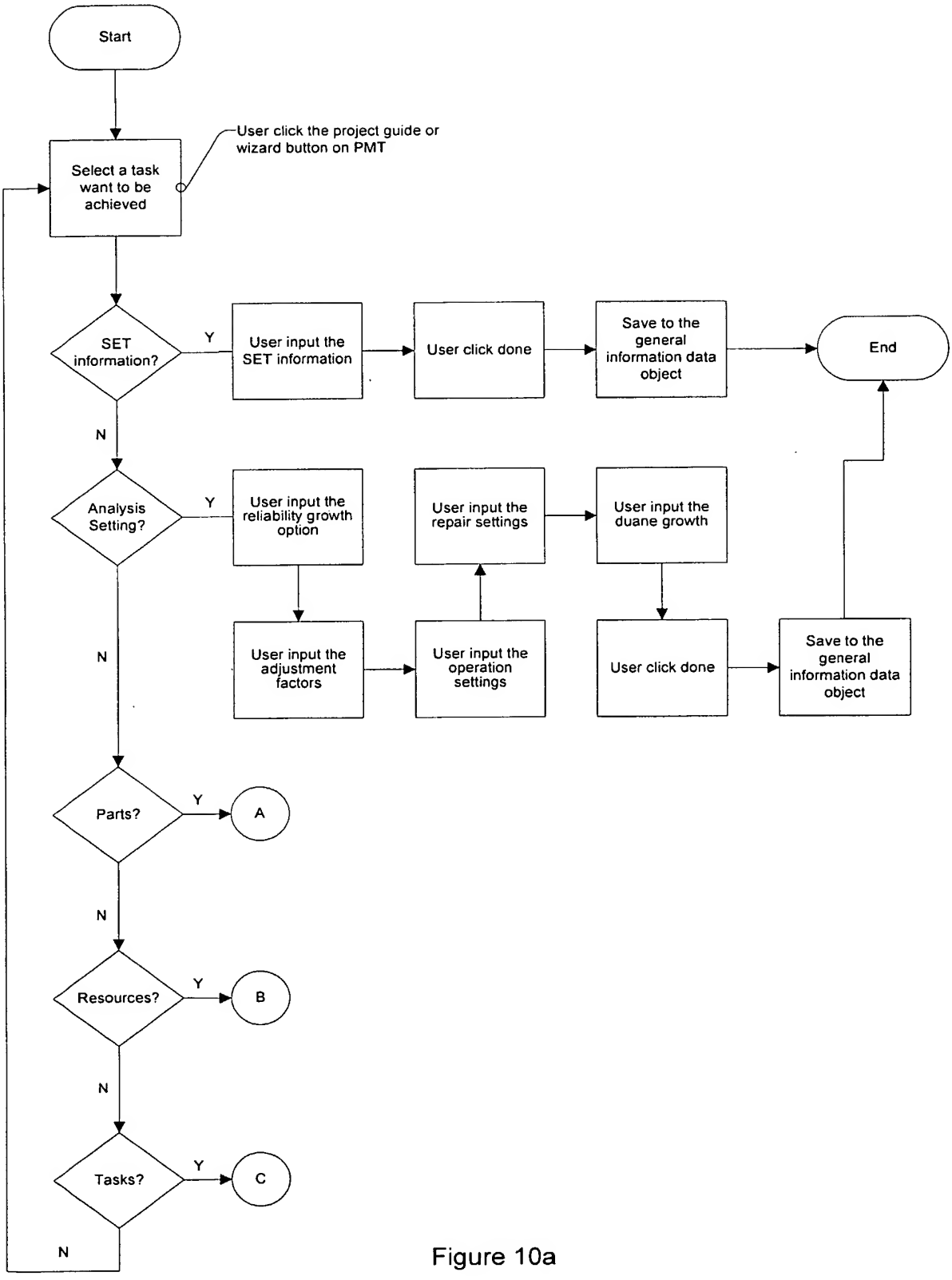
Start
Select a task want to be achieved
User click the project guide or wizard button on PMT
SET information?
Y
User input the SET information
User click done
Save to the general information data object
End
N
Analysis Setting?
Y
User input the reliability growth option
User input the repair settings
User input the duane growth
User input the adjustment factors
User input the operation settings
User click done
Save to the general information data object
N
Parts?
Y
A
N
Resources?
Y
B
N
Tasks?
Y
C
N

Figure 10a

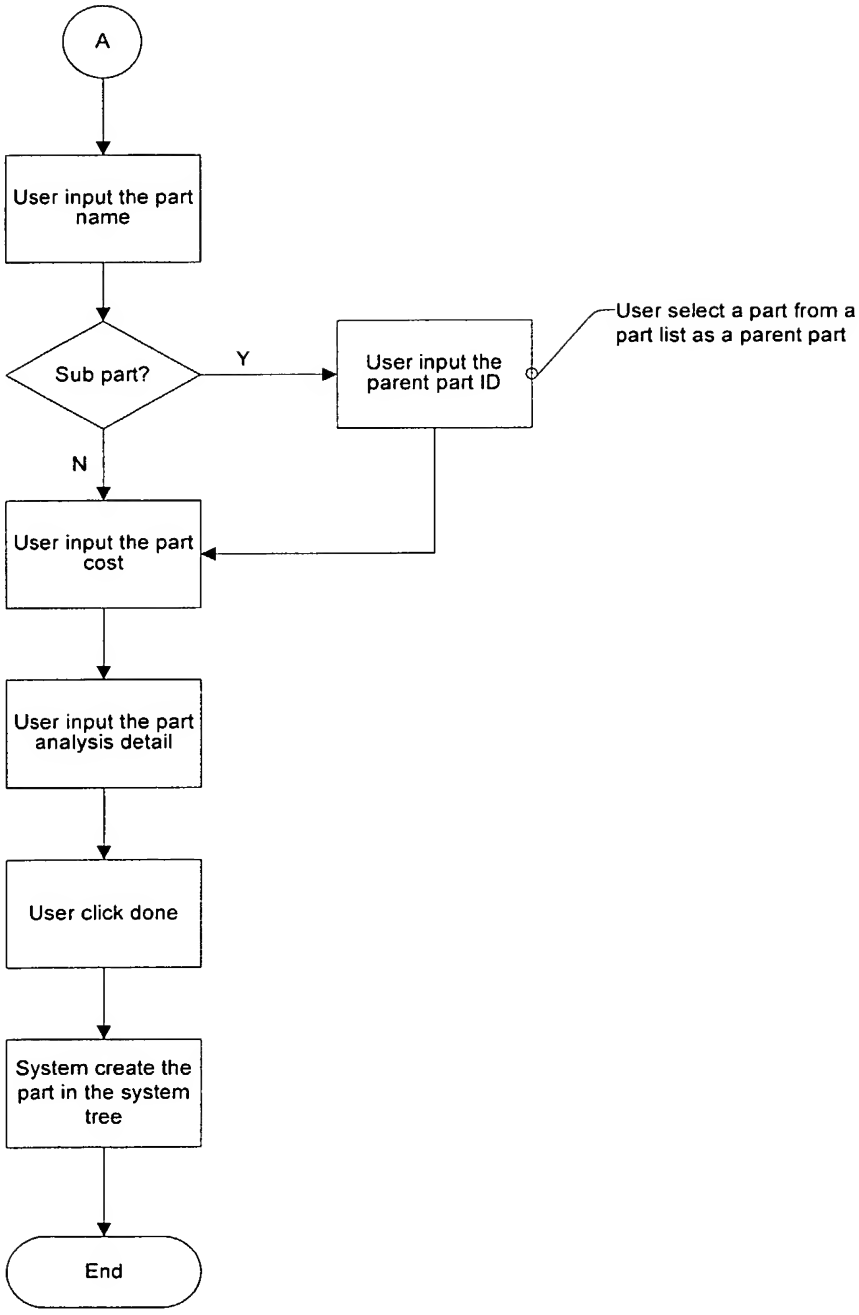
A
User input the part name
Sub part?
Y
User input the parent part ID
User select a part from a part list as a parent part
N
User input the part cost
User input the part analysis detail
User click done
System create the part in the system tree
End

Figure 10b

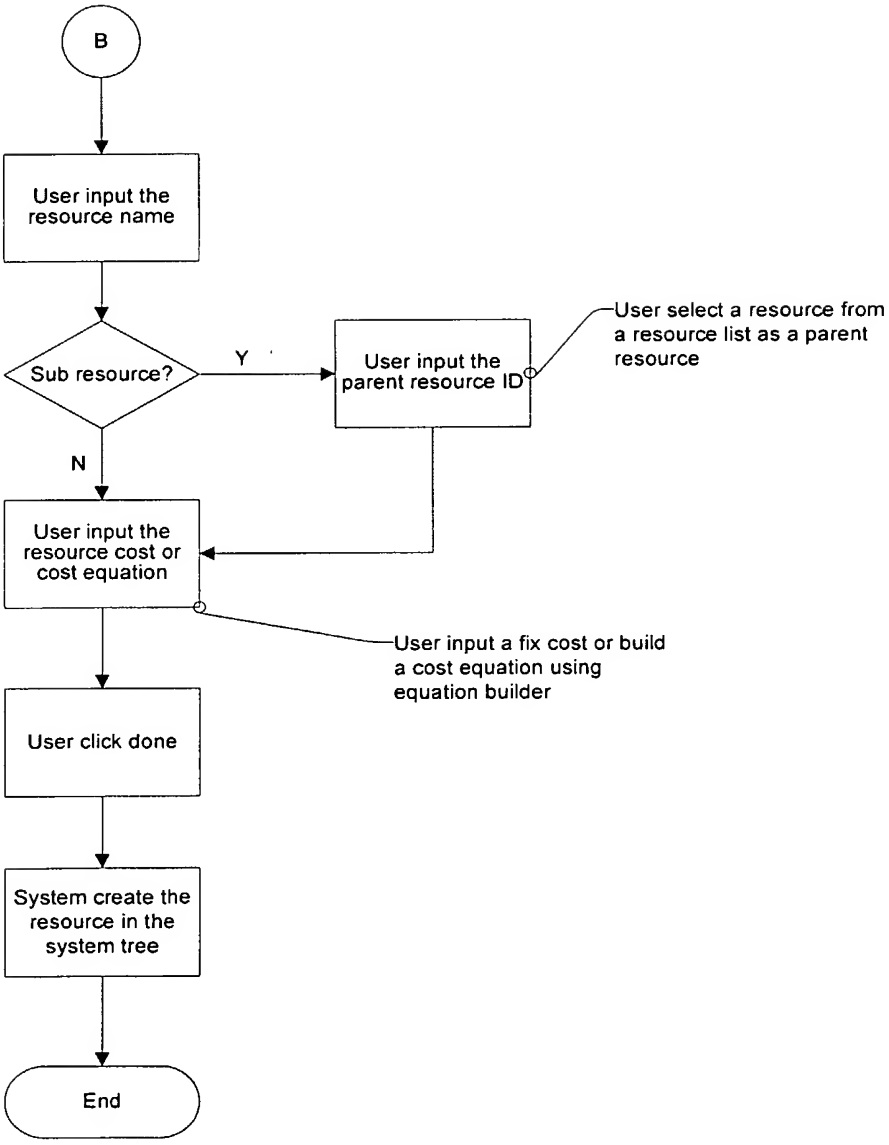
B
User input the resource name
Sub resource?
Y
User input the parent resource ID
User select a resource from a resource list as a parent resource
N
User input the resource cost or cost equation
User input a fix cost or build a cost equation using equation builder
User click done
System create the resource in the system tree
End

Figure 10c

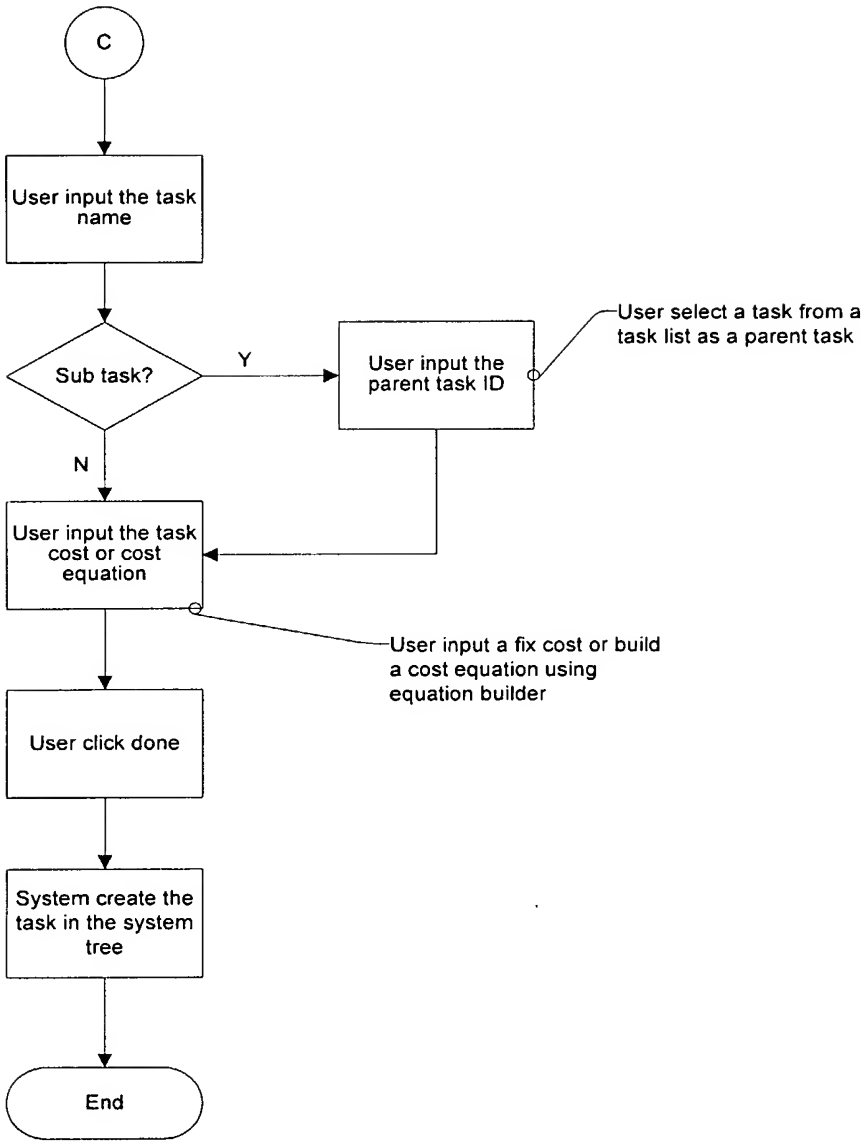
C
User input the task name
Sub task?
Y
User input the parent task ID
User select a task from a task list as a parent task
N
User input the task cost or cost equation
User input a fix cost or build a cost equation using equation builder
User click done
System create the task in the system tree
End

Figure 10d

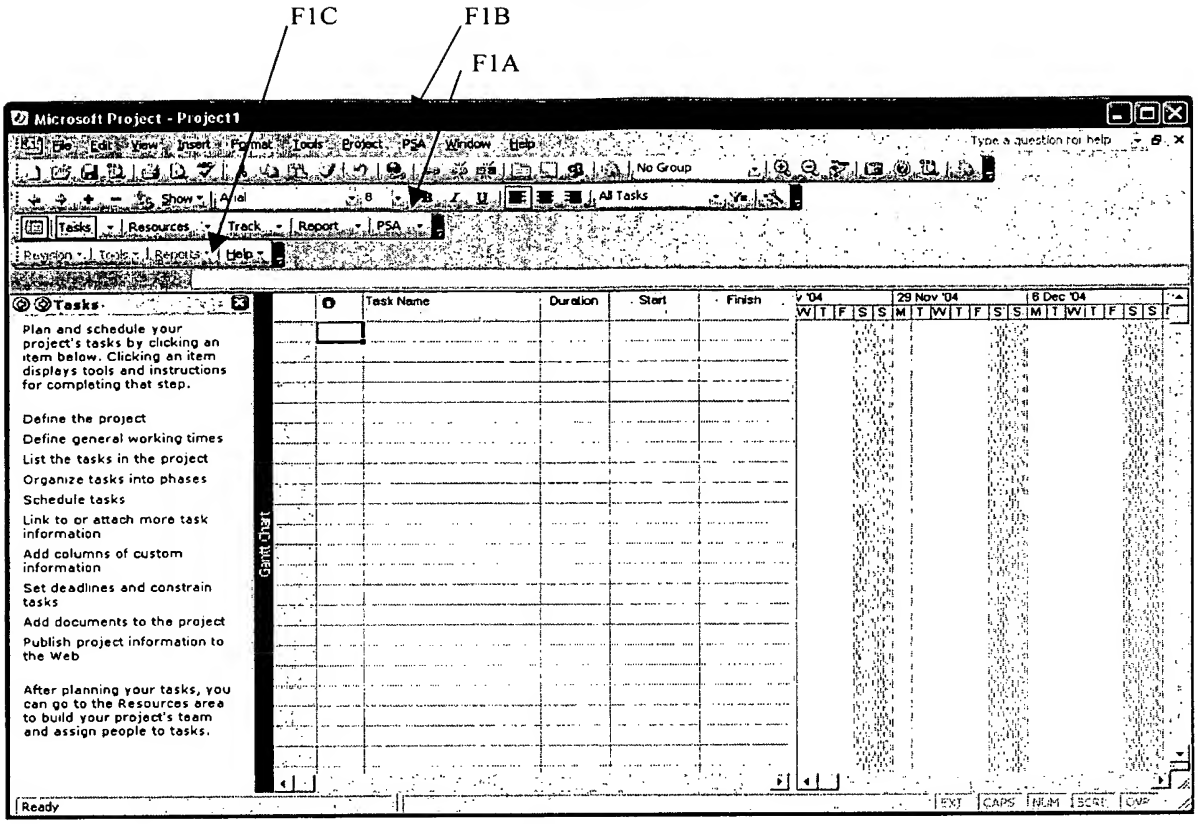

Figure 11a

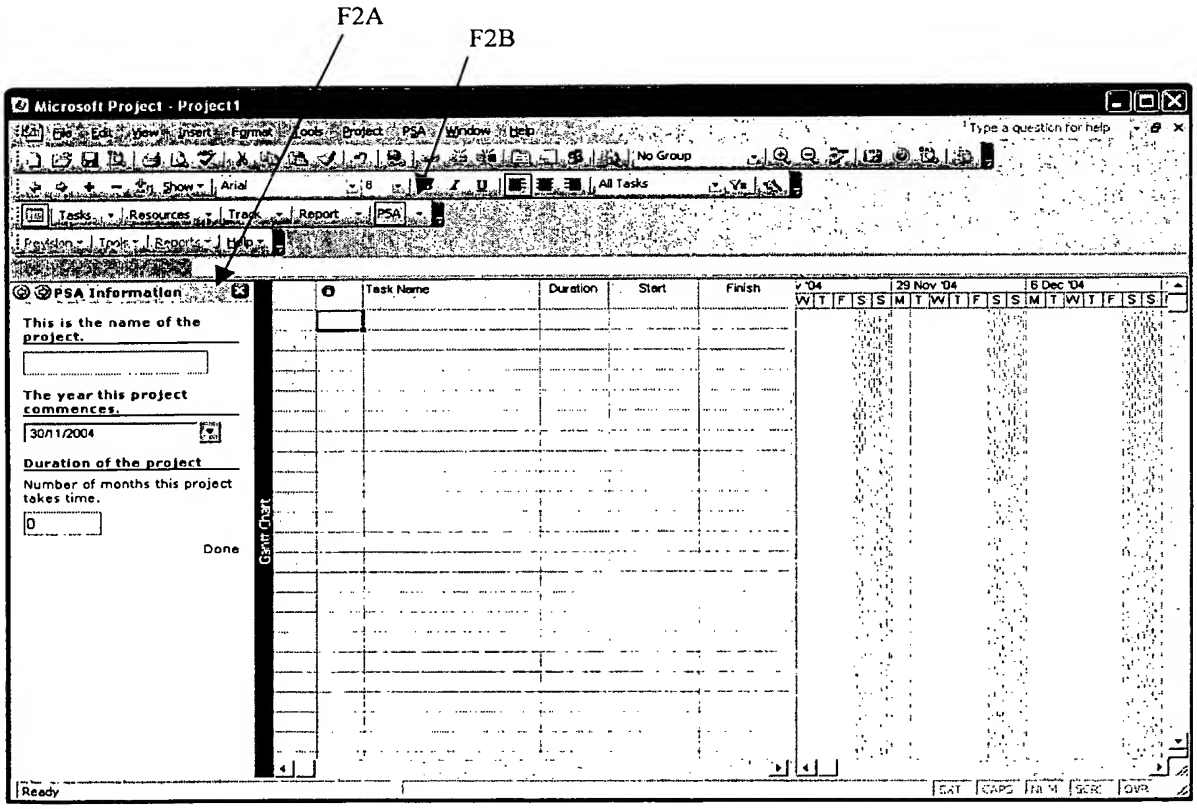

Figure 11b

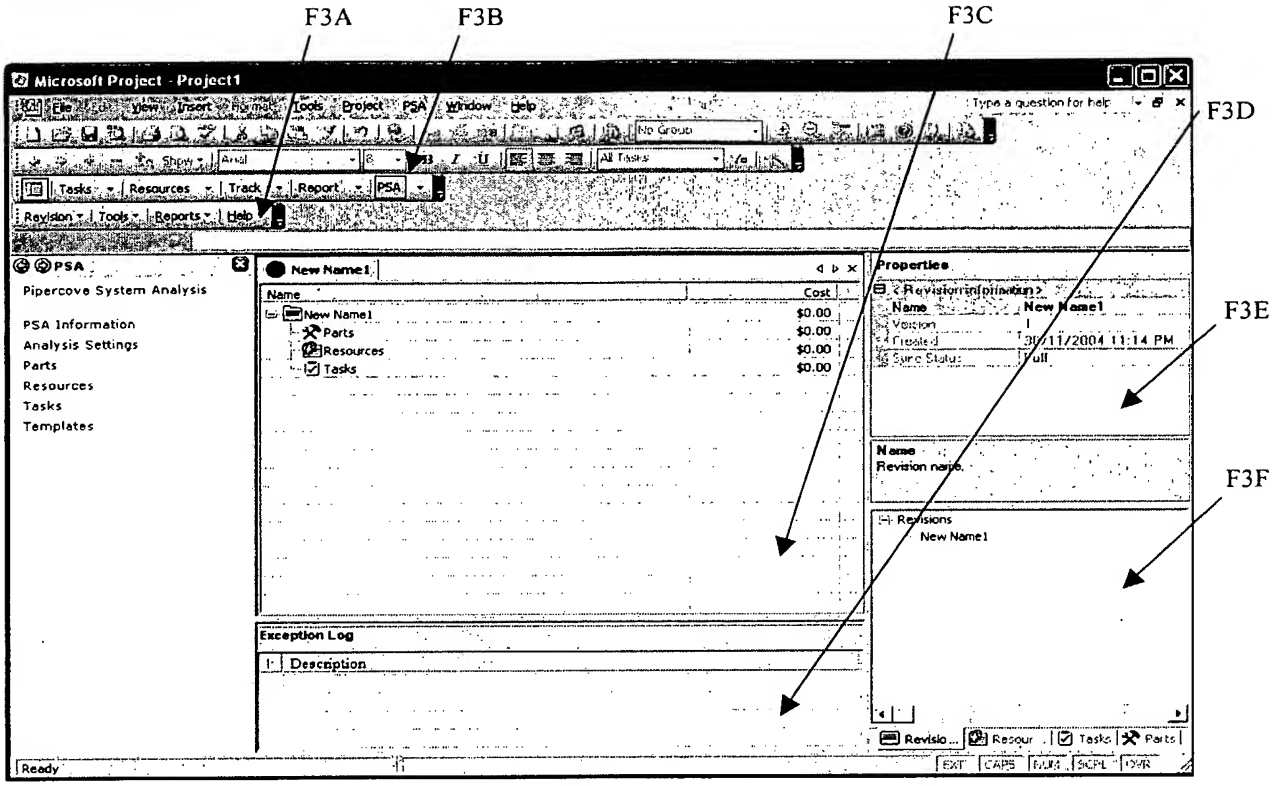

Figure 11c

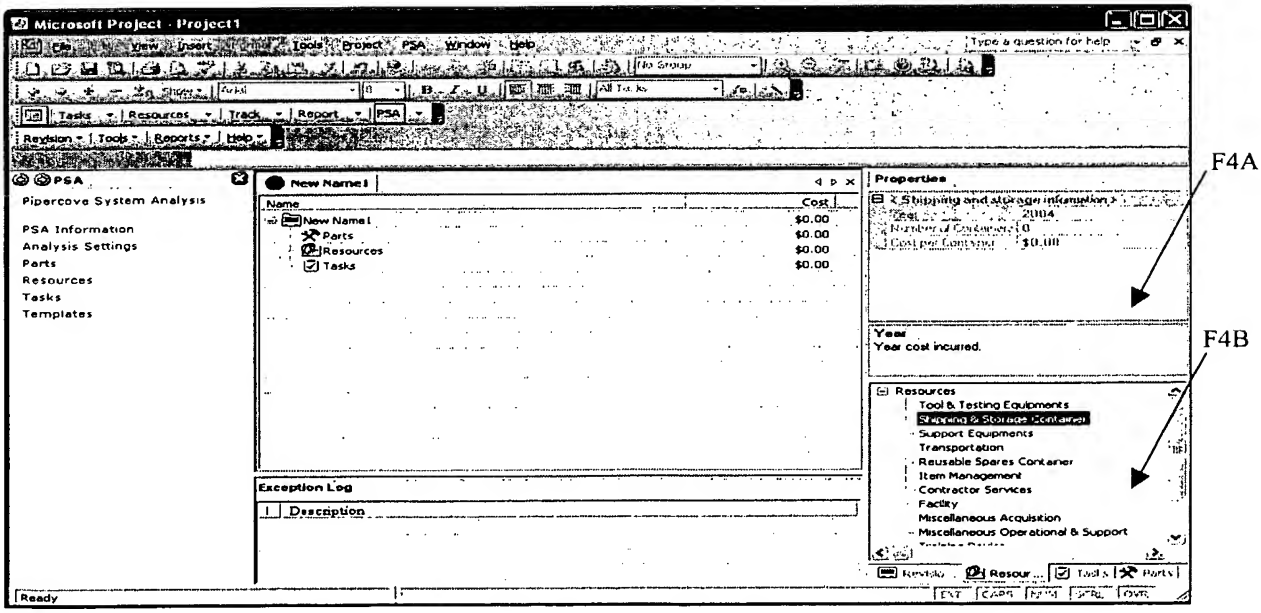

Figure 11d

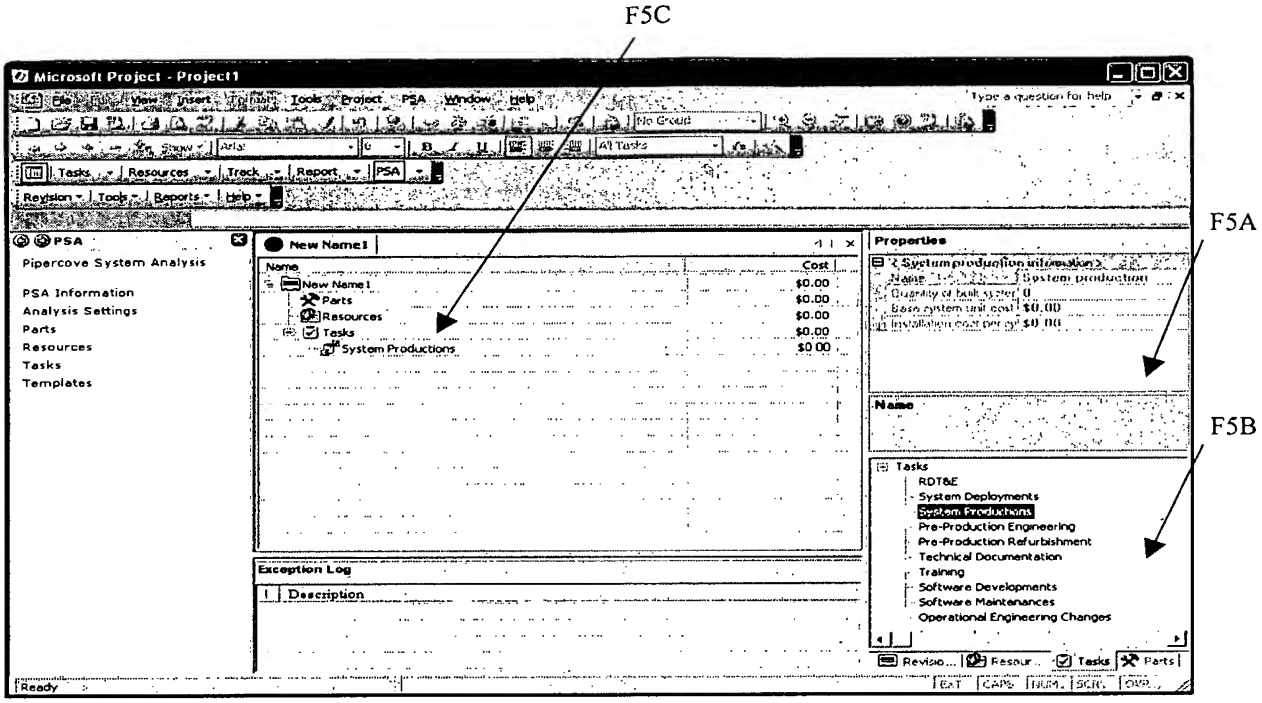

Figure 11e

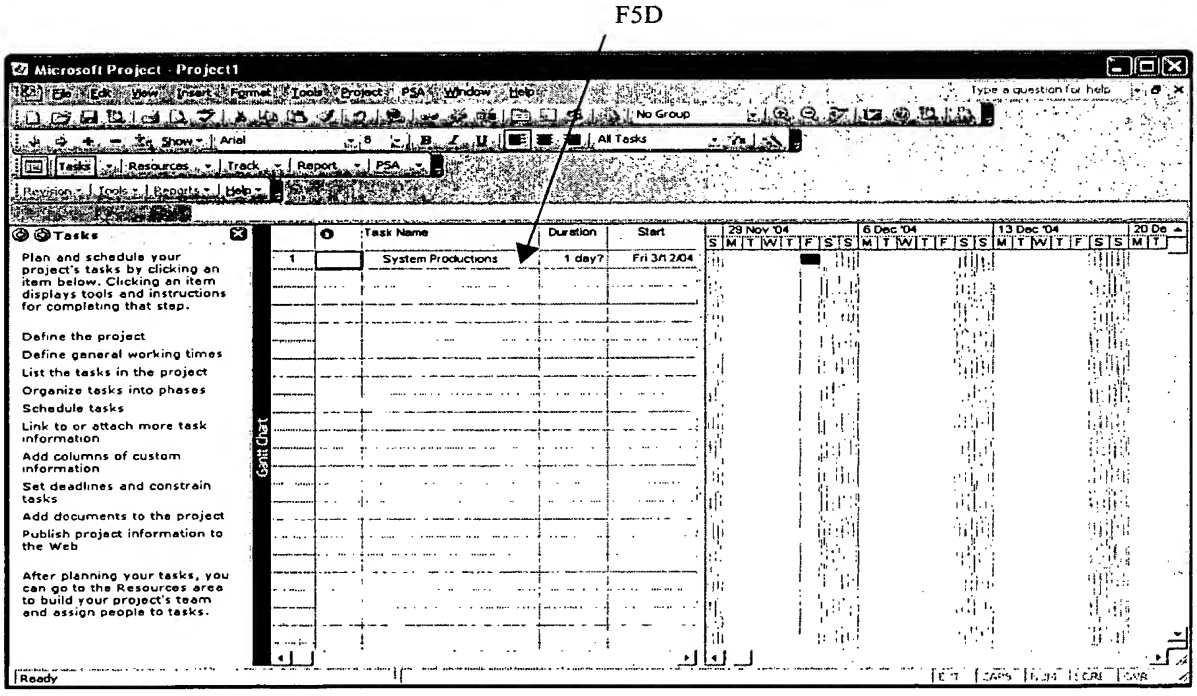

Figure 11f

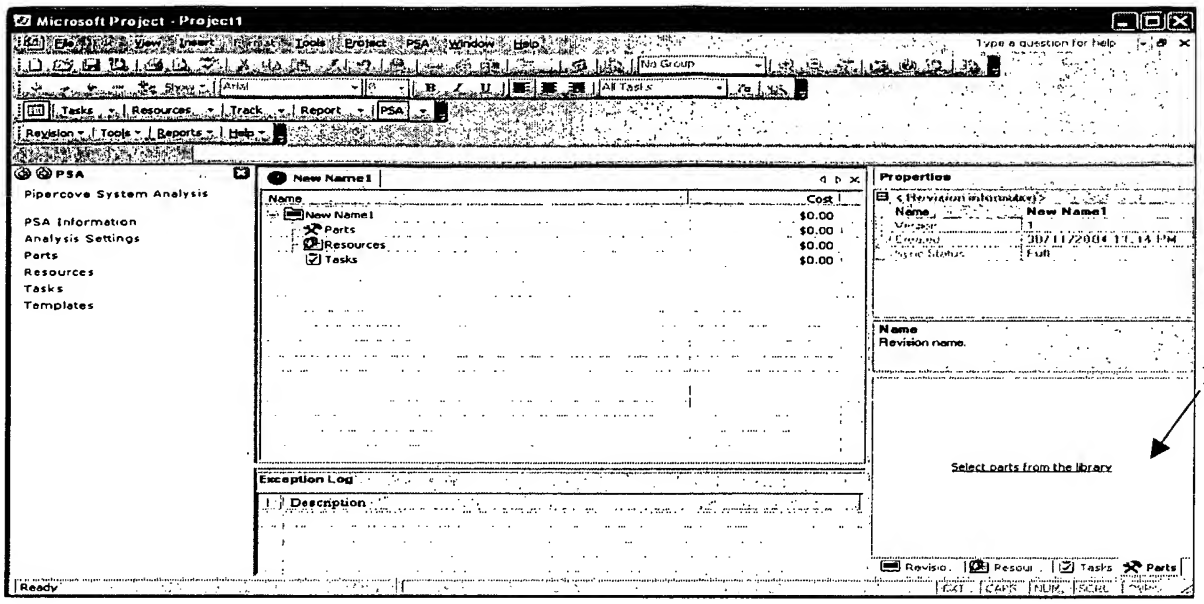

Figure 11g

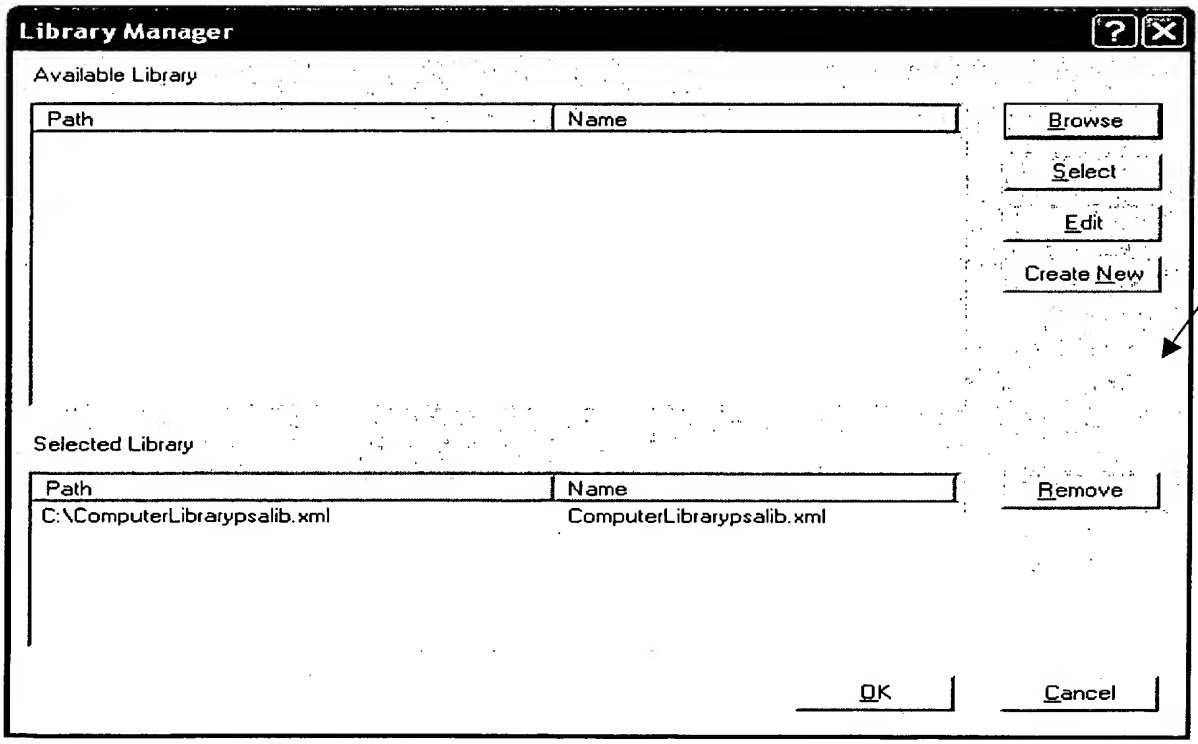

Figure 11h

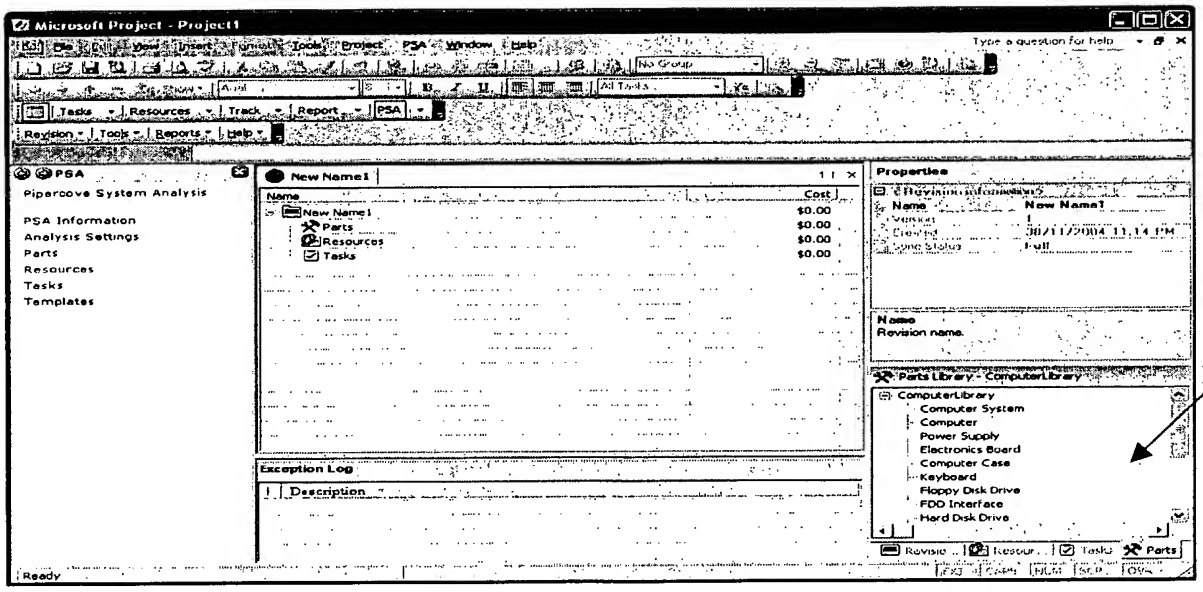

Figure 11i

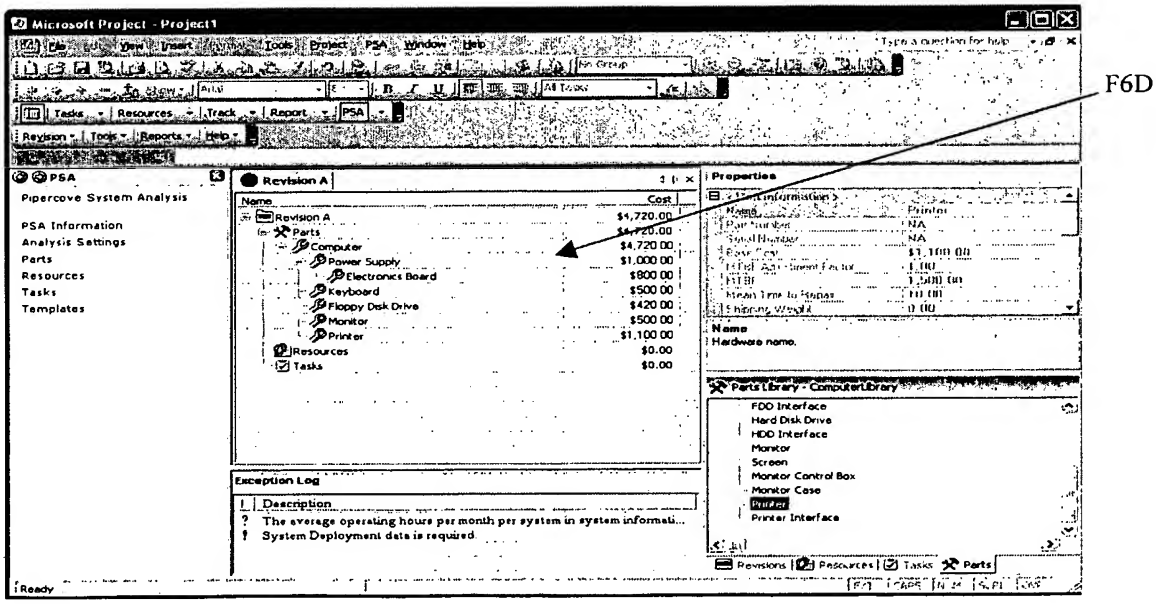

Figure 11j

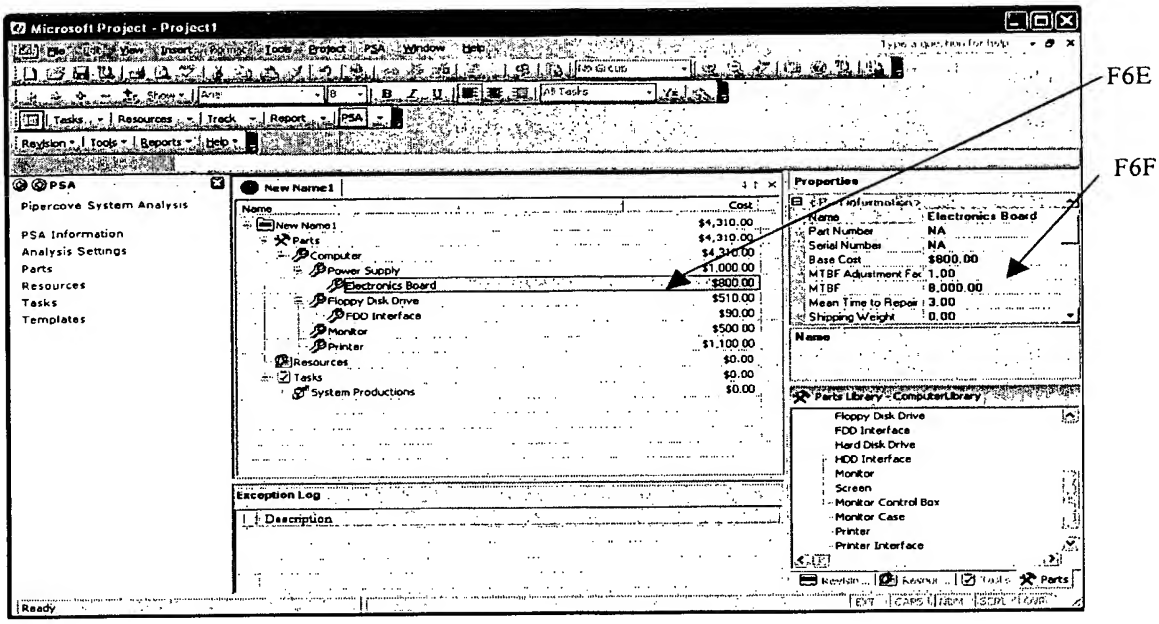

Figure 11k

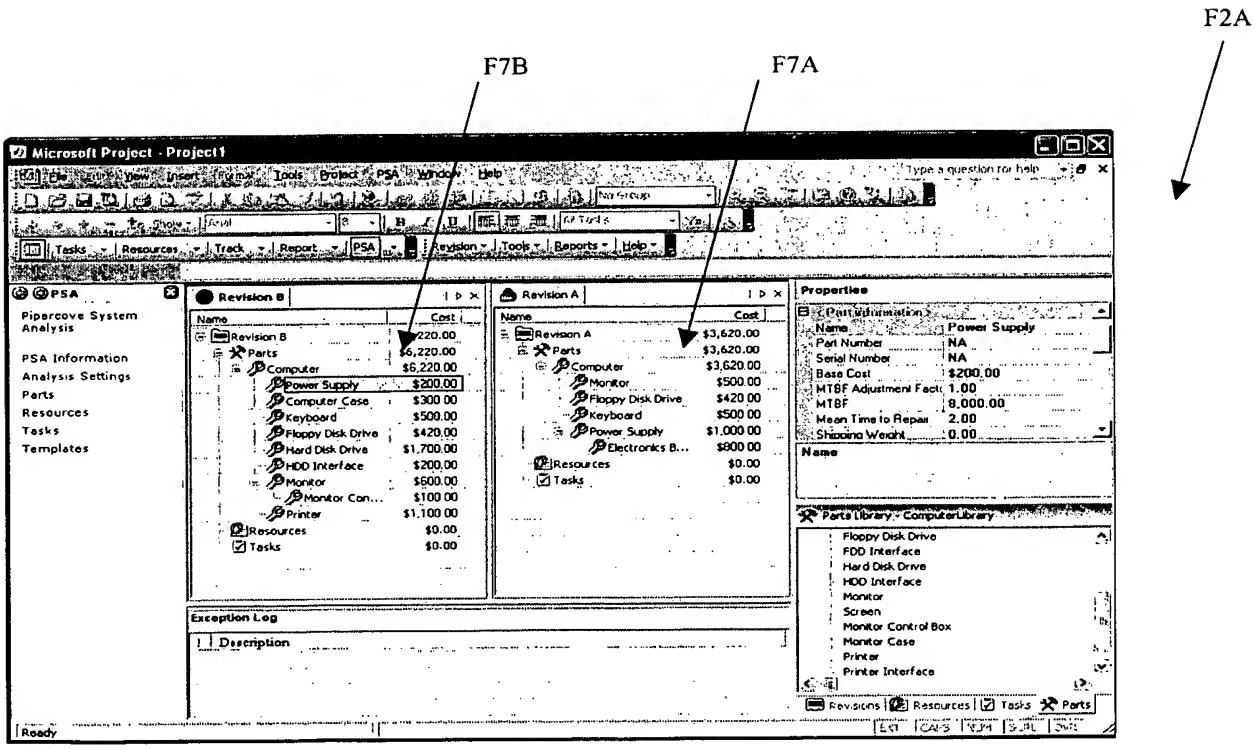

Figure 11l